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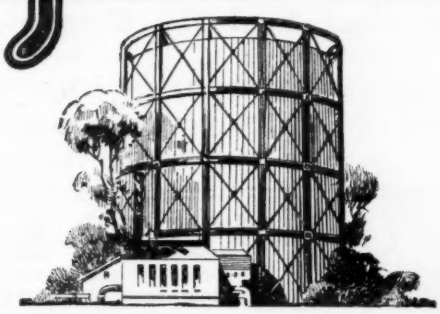

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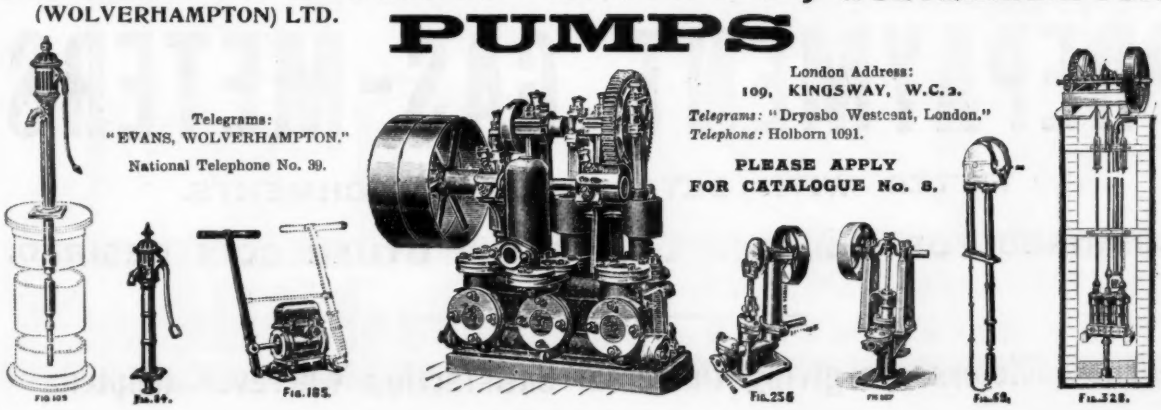

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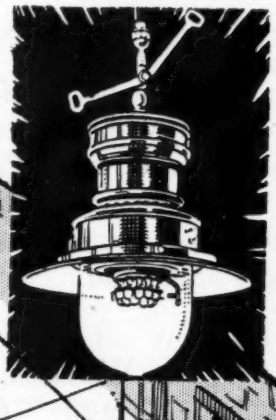

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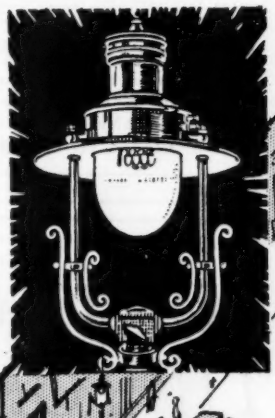

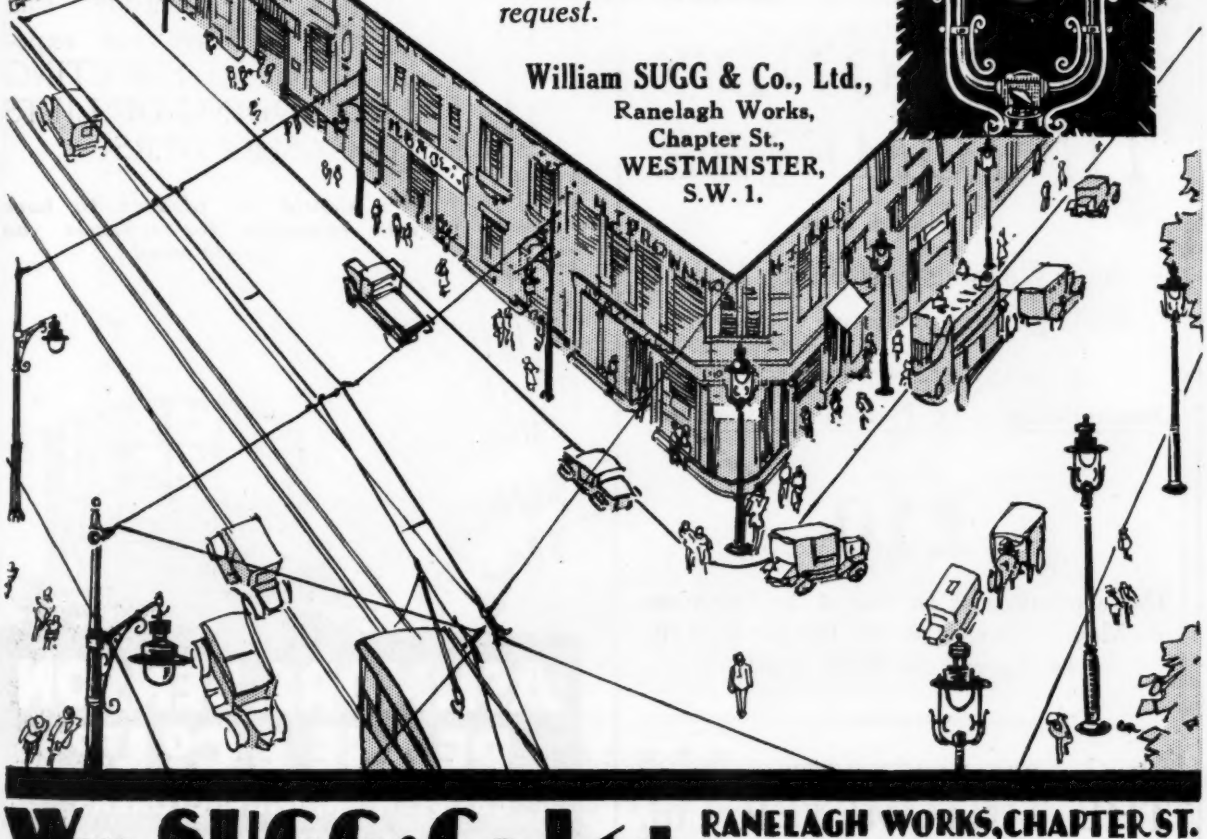

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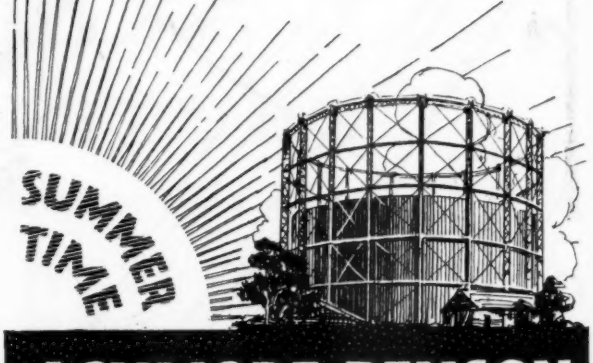

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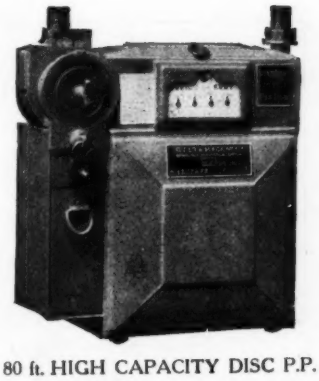

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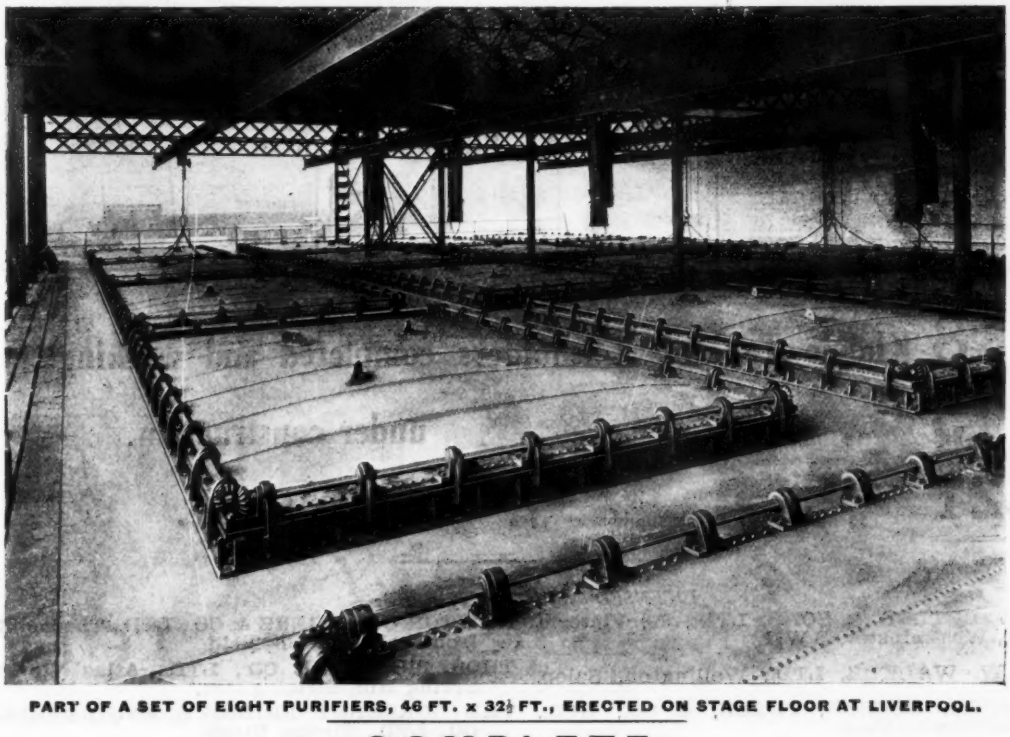

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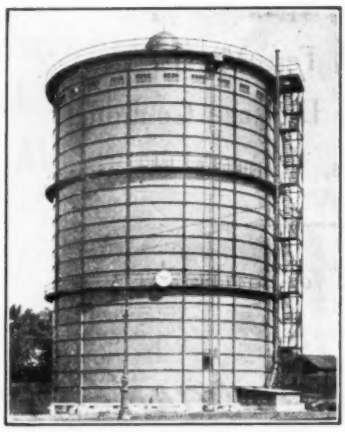

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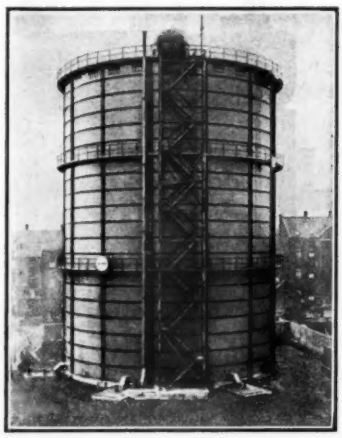

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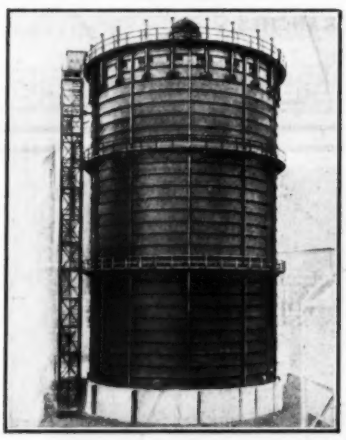

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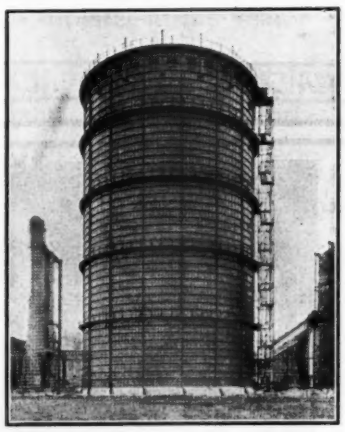

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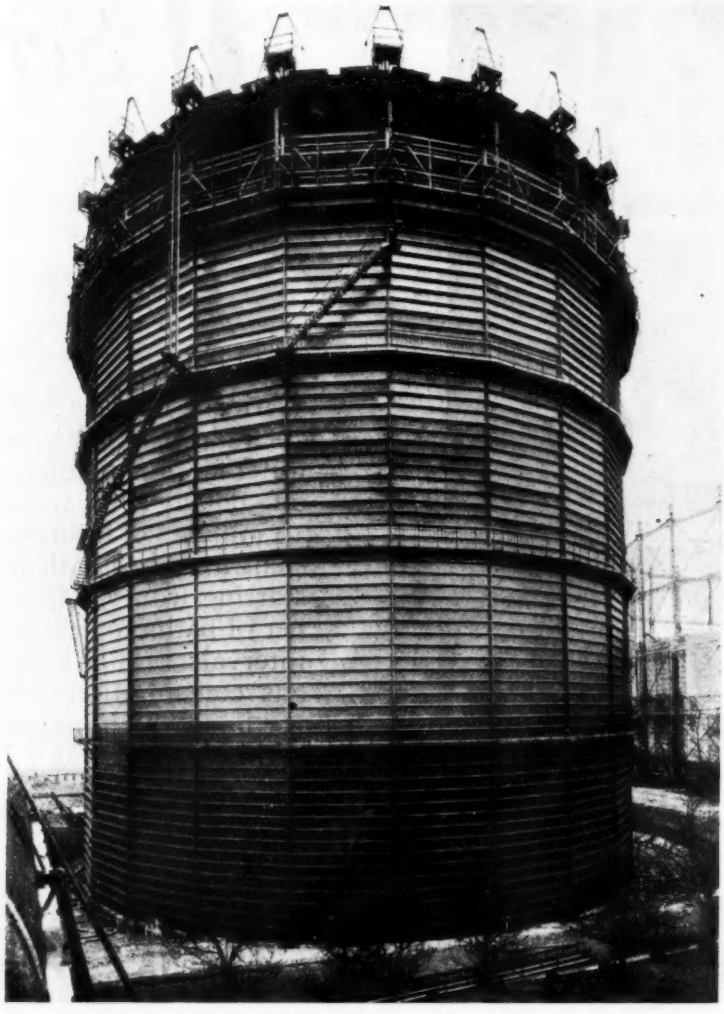

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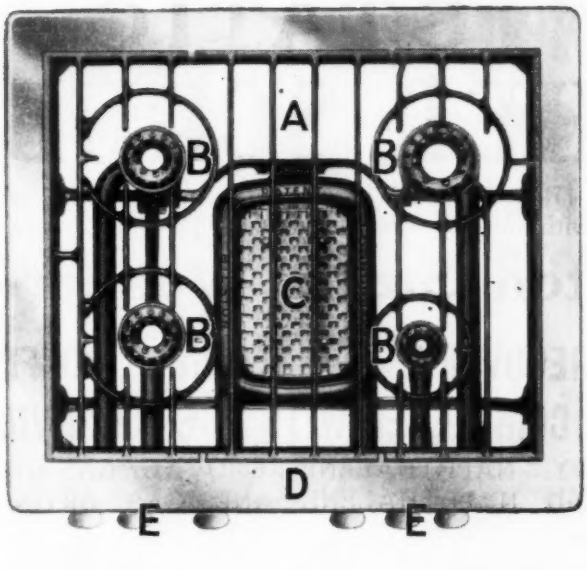

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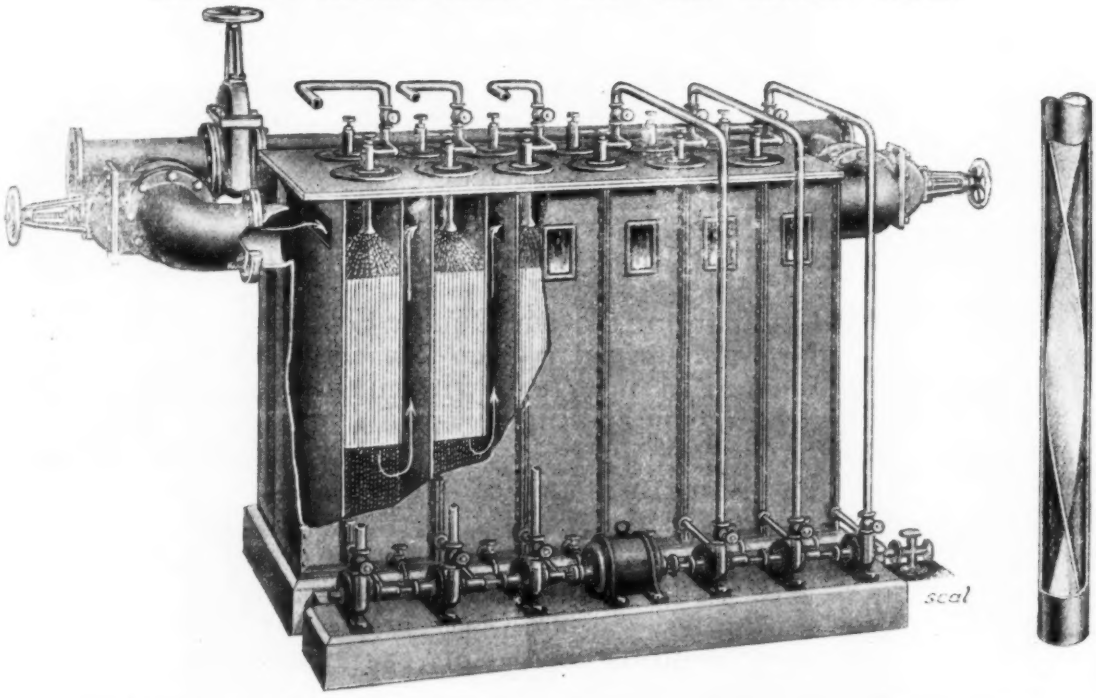

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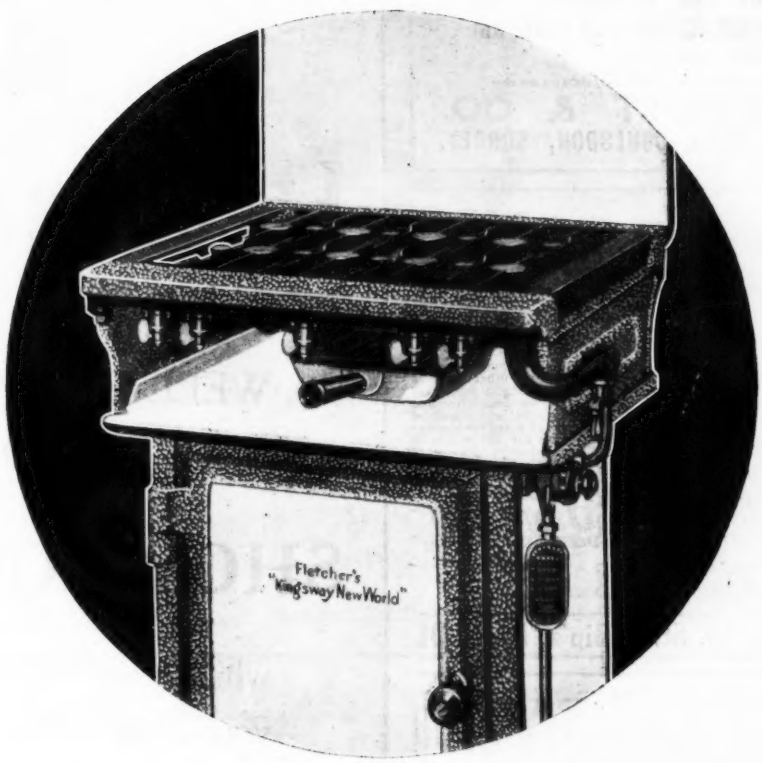

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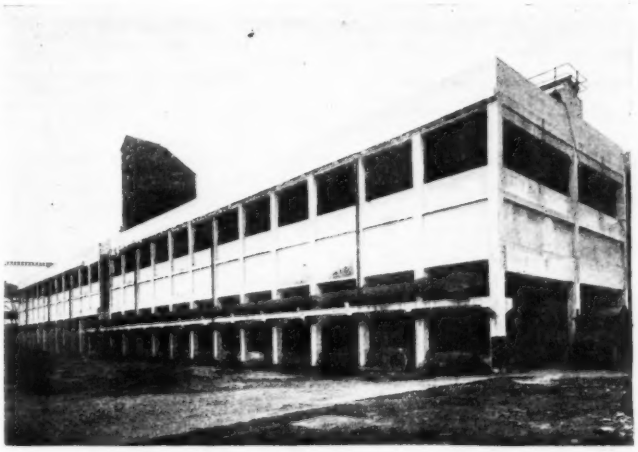

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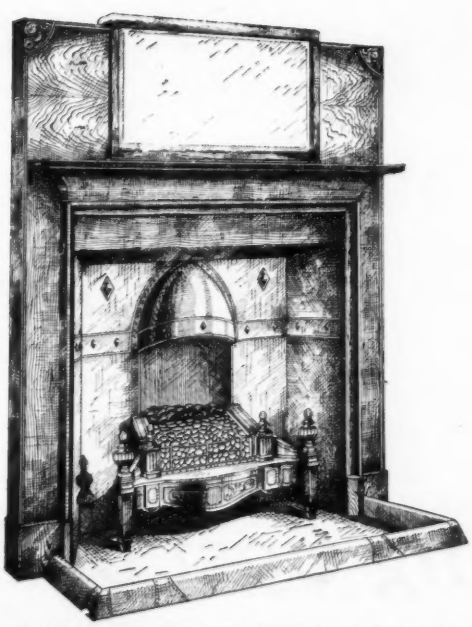

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VOL. CXC. No. 3497.] WEDNESDAY, MAY 28, 1930. [82ND YEAR.

Editorial Notes.

"Coming Events——"

We refer to next Tuesday, and, strange to relate, to to-day. In our thoughts, next Tuesday comes before to-day, which may upset relativitists, but is clearly justified, for next Tuesday the Institution Conference commences at Leeds. Not only the place of meeting, but also the meeting itself, will be unusual.

Leeds, however, enjoys both admirable facilities for conferences on a large scale, and an enviable reputation for sincere hospitality; and besides being the headquarters of the Institution's Research Organization and of the President, Mr. C. S. Shapley, it is within a stone's throw of country which Yorkshiremen naturally, but not without good reason, maintain is unsurpassed.

The commendable innovations which characterize the arrangements for the meeting itself, and of which our readers are already acquainted, cannot fail to enhance the value of the business proceedings; and the pleasure which the ladies are sure to derive from well-planned receptions and excursions—to say nothing of facilities for golf on a choice of first-rate courses—will augment the success of what, we are certain, is destined to be a memorable gathering.

And now, for a moment, let us turn to to-day. We felt that this unusual Mecca—and one possessed of such broad appeal—demanded an unusual effort on our part. With modesty we suggest that to-day's "JOURNAL" will be regarded as a fount of interesting information by those who wish to learn in advance something of the various visits and excursions which have been organized, and to acquire this knowledge in the most pleasurable manner.

The Report of the Area Gas Supply Committee.

The publication of the Report of the Area Gas Supply Committee is an event of outstanding importance to the gas industry. It may safely be said that no report has been awaited with greater eagerness—tinged with anxiety—by those who have the interests of our industry at heart.

We well remember the occasion when the first news of this "Gas Grid" Committee came to our ears. It was at the Banquet of the World Fuel Conference in London in September, 1928, that Sir Philip Cunliffe-Lister made the announcement that the Government had decided to recommend the establishment of a Committee to investigate the possibility of the distribution of surplus coke oven gas in the Lancashire and Yorkshire Areas. We then realized that this investigation would probably have a profound influence on the course of development of the gas industry, because, if it was to lead anywhere, it would inevitably get down to bedrock on the difficult subject of the relationship between the gas and the coking industries. Now the report is to hand, and it makes fascinating reading. The Committee have given us not merely their views, but the detailed technical information on which they based their views, so that we too may pen our minority reports or add, in spirit, our signatures to their recommendations. We trust that our readers will bear with us if we examine this report at some length from the viewpoint of the gas industry.

In their first report the National Fuel and Power Committee drew attention to the developments which were taking place in Germany, Belgium, and Northern France as regards the transmission of coke oven gas for town's purposes by pipelines. They considered that the possibility of developing a system of gas mains in industrial areas near coalfields in this country merited detailed investigation, and recommended that such a survey should be undertaken by the Government. They further suggested that in the first place the investigation might be confined to an area such as that lying between the Humber and Liverpool and between Leeds and Birmingham. This is a highly industrialized area, and includes many coke oven and gas plants, important industrial gas users, and a large urban population.

In January, 1929, the Government appointed the Area Gas Supply Committee "to make the investigation recommended by the National Fuel and Power Committee in their Report dated Sept. 4, 1928, into the technical and economic aspects of an area gas supply system." The terms of reference are at first sight somewhat limited and uninspiring, but reference to the report of the National Fuel and Power Committee shows that they had the foresight to urge that any gas network survey should "also consider the disposal of the coke, the location of coke oven plants with respect to iron and steel works, and the existing and potential consumption of coke, whether for the iron and steel industry or for domestic purposes." A consideration merely of the technique and economics of surplus coke oven gas distribution would have been of limited value, but the wider terms of reference give the Area Gas Supply Committee the opportunity of making a contribution of outstanding importance towards the economic development of the two great indusries engaged in the carbonization of coal—the gas industry and the coke oven industry. The lucid report, the accumulation of hitherto unobtainable data, and the far-reaching recommendations are sufficient evidence that the Area Gas Supply Committee saw their opportunity, and took it fearlessly and impartially.

The Chairman of the Committee was Sir Alexander Walker, K.B.E., the other members being Mr. Thomas Hardie, Dr. C. H. Lander, C.B.E., Mr. W. A. Lee, C.B.E., the late Mr. M. Mannaberg (a distinguished leader in the iron and steel industry, who died before the work of the Committee was completed), Sir Richard Pease, Bart., Mr. Samuel Tagg, and, for the latter portion of the inquiry, Mr. J. Henderson. Dr. E. W. Smith acted throughout as Hon. Technical Adviser, and Dr. G. W. Anderson acted as Technical Consultant, being assisted for some time by Mr. F. S. Townend. In the course of the inquiry a large number of witnesses gave evidence, and the Committee express their thanks to all those who by their carefully prepared statements facilitated the investigation. The list of witnesses contained in Appendix I. is truly impressive, and shows how thoroughly the Committee went into the subject. The second chapter summarizes the evidence taken concerning long-distance transmission of coke oven gas in Europe. The Committee came to the conclusion that the conditions of gas supply in Germany are so different from those obtaining in this country that it does not follow that German schemes are applicable in Great Britain. Conditions in Great Britain must be examined in detail before the possibilities can be assessed.

Statistics of the Carbonizing Industries.

The third chapter of the report is devoted to the compilation of statistics relating to the carbonizing industries. These statistics are in the main obtained from answers to questionnaires sent out by the Committee to the various companies and undertakings in the area under consideration. We have no hesitation in stating that these figures are unique, and are in themselves of very great importance to the gas industry. Dealing first with coke ovens, it is shown that, though the area under investigation embraces 14,300 square miles (Lancashire, Yorkshire, Cheshire, Derbyshire, Nottinghamshire, Lincolnshire, Staffordshire, Leicestershire, and Warwickshire), 75 p.ct. of the coke ovens are concentrated in a belt of country 950 square miles in extent, while about 35 p.ct. of the coke ovens are concentrated within a circle of about 7 miles radius in the Sheffield district. It is shown that the ovens in the investigation area carbonize 6·73 million tons per annum, or 38·6 p.ct. of the total coal carbonized by coke ovens in Great Britain. In 1928 the surplus coke oven gas "available for other purposes"—*i.e.*, not used for works purposes or sold—amounted to about 2600 million c.ft., or 4 p.ct. of the total quantity of coke oven gas made in the area. After 1930, according to statistics supplied, this "surplus" gas will have increased to 11,744 million c.ft., notwithstanding an increase in gas sales already arranged of over 4000 million c.ft. per annum. If remunerative prices were offered, coke oven gas at present used for steam raising, &c., could be made available; and in the investigation area, if the remainder of the ovens were modernized, the total surplus gas available for sale after allowing for oven heating would reach over 57,000 million c.ft. per annum.

In the investigation area there are situated 355 gas undertakings, of which 330 are actually producing gas. The total coal carbonized in 1928 amounted to 6·4 million tons. The total quantity of gas made (coal gas and water gas) amounts to 107,000 million c.ft. per annum, in addition to which 4400 million c.ft. are bought in bulk. At the present time there is 28 p.ct. reserve daily capacity in gas-making plant. It is a striking figure to find that in 1928 nearly 80 p.ct. of the total gas disposals were for domestic purposes. The replies of the various gas undertakings in the area lead the Committee to anticipate the percentage increase per annum under present arrangements to be as follows: Domestic purposes, 2·2 p.ct.; public lighting, 3·1 p.ct.; other purposes, 0·8 p.ct.; giving a general figure of 2·0 p.ct. We feel that these figures themselves show the need of the Area Gas Supply inquiry.

In 1931, on the present basis of development, the total demand for gas will be 109,000 million c.ft. Gas-works and coke ovens by working at (say) 80 p.ct. maximum capacity will be in the position to supply 188,000 million c.ft. per annum. What is going to happen?

The coke figures are equally startling. In 1928 the coke ovens in the area made 4·7 million tons of coke, of which 1·1 million tons were sold for industrial and domestic uses. The gas-works in the area made 3·35 million tons of coke, of which 2·58 million tons were sold for industrial and domestic uses.

By the end of 1930 the coke ovens expect to be making 6·7 million tons of coke. In the Report (Table IX.) this

extra 2 million tons of coke is stated to be disposable to iron and steel works, the domestic and industrial figure remaining almost the same. The gas undertakings only expect a 2 p.ct. increase in demand for coke. If the iron and steel industry do not take up this extra coke, and if the coke ovens can get a better price for their coke by developing their industrial market—again, what is going to happen?

To us it appears that the gas and coking industries have two alternatives—either co-ordination and co-operation to the national advantage, or competition to their own and the national disadvantage. It is the former policy that the report which we are at present considering advocates. In Chapter V. the coke position is squarely faced, and the Committee urge the extension of co-operation between the gas and coking industries with regard to the sales thereof "to secure a measure of initial control over sales and production of coke."

Coke Oven Gas for Town Supply.

CHAPTER VI. leads into what may be regarded as the crux of the whole report—namely, the use of coke oven gas for town purposes. We would suggest that this is the chapter which caused the greatest difficulty to the Committee. The report states that "the increase in the quantity of coke oven gas taken by gas undertakings during recent years indicates that the gas industry as a whole has not been averse from absorbing coke oven gas." We are glad this statement appears, for it is one which has been brought out many times in these pages. Too often has the picture been painted of the gas industry standing aloof from, and even spurning offers of supplies of, coke oven gas.

The Committee were appointed to investigate a gas network, and, therefore, they confine their attention to the absorption of coke oven gas in such a network, although they publish the general views of the coke oven representatives who make such modest requests as full mandatory powers to coke oven gas suppliers to enable them to supply gas in bulk to large industrial gas consumers situated close to the ovens, the right to supply gas for lighting and heating, and the opportunity of constituting an advisory board to see whether gas undertakings are justified in extending their plants. We will follow the example of the Committee, and pass these suggestions without comment, as they do not arise in the present instance.

As regards the subject of the establishment of a network scheme, the Committee consider that in the majority of cases negotiations as between willing buyers and sellers will continue, and this attitude will hold in connection with the establishment of any networks. They recommend that the Joint Committee of the National Gas Council and the National Association of Coke Oven and Bye-Product Plant Owners, which has been established to mediate in cases of difficulty, should be extended to include representatives of the South Yorkshire coke oven owners. No further machinery or measure of compulsion is in their view necessary at the moment, but they hint that lack of progress may lead to arbitration by the Board of Trade. In order to secure continuity of gas supply into a gas network, it is recommended that coke ovens should store coal at the ovens.

The Ownership of a Gas Network.

UPON the difficult subject of ownership of the gas network, the Committee were unable to come to a unanimous agreement. They are, however, unanimous that the grid should not be owned solely by the coke oven owners. The National Gas Council urged ownership of the grid by authorized gas undertakings. A third alternative is the ownership of the network by companies on which both gas undertakings and coke oven owners are represented. The Committee state "if it were clear that these bodies would not act as gas distributors direct to consumers, except in cases where the gas undertakings consented to their supplying a large consumer direct (the withholding of such consent to be subject to safeguards), we could have no objection to this alternative proposal in principle." But when they come to a practical test case the Committee find themselves divided on this matter.

The practical outcome of the whole report—which we shall later discuss in some detail—is the recommendation of the immediate establishment of a gas network in South Yorkshire, with Sheffield as the pivot. What does the Committee say about the ownership of this network? There are two alternative proposals. The first is that, owing to the urgency, the network should be owned by an existing gas undertaking (thus eliminating the need for special powers)—namely, the Sheffield Gas Company. It is pointed out that the greater part of the consumption from the network is in the Company's area of supply—a Company which has already set out to cater for a large industrial load, and is already purchasing a large quantity of coke oven gas.

The second proposal is that the general principle should be adopted in this case of joint ownership of the network between gas undertakings and coke ovens. Those members of the Committee who subscribe to this alternative state that they "appreciate the fears of the coke oven owners that their position might be seriously prejudiced if the network were entirely in the hands of one gas supply undertaking, which might sterilize future development of the network."

It is stated that the two proposals "commanded about equal support of our members," and thus the Committee left the decision to higher powers. Seeing that the Committee are "all agreed that the establishment of a network in South Yorkshire is a matter of urgency," we trust that the first recommendation may be given support. If the gas undertaking owning the network were to be allowed to pocket the profits from such a scheme, the apprehension of the coke oven owners would be understandable, but the Committee make the definite suggestion that the gas network scheme accounts should be kept separate, and that the net profit should be divided in two equal parts between the Gas Company and the coke oven owners who supply the gas.

In the South Yorkshire scheme there seems to us to be a *primâ facie* case that the Sheffield Gas Company should own the network. Here is a progressive Gas Company which admittedly for many years past has been developing the industrial sale of gas in its area of supply, has been purchasing coke oven gas in large quantities, and has already all the necessary statutory powers to buy and distribute gas. It is almost unthinkable that a new organization should be set up in the Sheffield area to supply a few large industrial users.

The South Yorkshire Network Scheme.

ON the information available to them the Committee consider that conditions are not favourable either in Lancashire or West Yorkshire for a gas network. But in South Yorkshire, where there is a larger volume of gas available, and where the district is highly industrialized, they consider that a network is on certain assumptions justifiable. Their proposals are briefly as follows: Gas will be collected from 19 coke oven plants, the maximum daily volume being 80 million c.ft. The gas will be purified at the coke ovens, and will be compressed at the expense of the oven owners. The length of main in the scheme proposed would be approximately 73½ miles, and the complete scheme would cost approximately £537,000 (including steel mains, main laying, and compressors). It is considered that the cost of distribution, excluding compression, would vary from 0·25d. per therm to 0·13d. per therm, according to the quantity.

Such a scheme should, in the view of the Committee, be put into operation without the use of public funds for capital expenditure, with the exception of assistance through the Development (Loan Guarantees and Grants) Act, 1929. No definite lead is given as to the ownership of this network (as we have already mentioned), but it is stated that all gas sold from the network in a gas undertaking's area of supply, whether sold direct from a network or through existing distribution systems, should be regarded as gas supplied by the gas undertaking in question, which undertaking should receive a reasonable commission for the sale of the gas. It is recommended that the organization owning the network be given powers

to lay mains through the areas of supply of statutory gas undertakings in the district, and to offer bulk supplies of gas to those gas undertakings who wish to buy it.

The scheme is presented with characteristic thoroughness, including consideration of capital costs, costs of compression, sizes of mains, costs of distribution, and so on. Such technical aspects as degree of purity of gas, and the pros and cons for dehydration and naphthalene washing are duly discussed. It is pointed out that the scheme is designed so that it can be laid out in sections as desired. No difficulty is anticipated in the transmission of gas over a network of the size proposed in South Yorkshire.

Two questions immediately arise in a review of such a scheme. First, where are the buyers of this gas, and, secondly, what price will such gas be sold at? Both these questions are boldly faced in the Area Gas Supply Committee Report. Even in the highly industrialized area of South Yorkshire, the Committee consider that in the ordinary course of development there is not sufficient demand to absorb this coke oven gas. A consideration of the industrial value of coke oven gas was, therefore, required.

In many industries it is considered that producer gas is costing 2d. per therm. In the iron and steel industry in South Yorkshire, the conclusion is reached that for open hearth steel ingot production, and steel casting work there is a total potential demand of 80 million c.ft. of coke oven gas per day. The witnesses of the iron and steel industry led the Committee to believe that the steel industry would certainly be prepared to pay 1·5d. per therm for town gas, and 2d. for certain purposes. The Committee believe that an average price of 2d. per therm would attract a large demand. They know that town gas is being used to-day for certain steel works purposes in Sheffield at a price of 2·4d. per therm.

While the Committee state that they "do not propose to indicate what we consider to be the appropriate selling price for coke oven gas," they proceed in Chapter XIII. to show that the network scheme is an economic possibility at 2d. per therm—a figure which "will attract a very large demand for gas from the iron and steel industry." We can well imagine that this hint of the "value" of coke oven gas will come as a disappointment to certain of the coke oven owners, but if they will study the statistical summary they will see that it is only by developing entirely new fields of industrial use of gas that the large surplus can be absorbed. It may have been possible in the past to fix up individual isolated contracts for the supply of coke oven gas to gas undertakings at high prices where the gas was to be sold largely for domestic and small industrial uses, but a comprehensive network scheme can only be economically justified at gas prices to attract the large industrial users who have perfectly definite views of the "commodity value" of coke oven gas.

The Gas Industry and Cheap Gas.

It is a matter of satisfaction that the Committee have gone out of their way to stress the disadvantages under which the gas industry is at present labouring in regard to the supply of cheap gas. They state that "industry must have cheap gas. The greater the load on gas undertakings, the lower are their overhead costs per unit of gas sold, so that if a large market can be attracted by offering cheap gas, the effect is to bring down gas prices all round." It is the opinion of the Committee that—

> "the introduction of a more scientific method of charge based not only on quantity, but also on the commodity value of gas and the service given, and if possible also the load factor (*i.e.*, the period during which the gas is taken in relation to the peak load demand) is vital if an expanding market is to be found. So long as a means is secured for affording protection to the 'ordinary' or 'domestic' consumer against inordinate increases in his present cost of gas, we recommend the above system, which is similar to methods of sale largely adopted by electricity undertakings."

We have quoted this recommendation in full, for fear of misrepresenting it in paraphrase. It needs no emphasis on our part to state how far-reaching an influence the adoption of such a recommendation would have in the growth of the gas industry. The Committee also give a favourable word in the direction of the gas industry being allowed to rationalize the sales of its bye-products and to become joint owners of central plants.

To sum up, the report of the Area Gas Supply Committee examines impartially and minutely the case for the establishment of a gas network in certain areas. It shows the trend of development of gas supply, and discusses the potential demands for cheap gas in industry. As a practical and immediate outcome, it offers us the South Yorkshire network scheme. We trust that the establishment of such a scheme, preferably sponsored by the Sheffield Gas Company, will be proceeded with forthwith.

The report is one concerning which all those who were connected with its preparation may be justly proud. When the personnel of the Committee were originally appointed, the gas industry were well satisfied that two gas engineers of such eminence and sagacity as Mr. Thomas Hardie and Mr. Samuel Tagg had agreed to serve. In this Committee of conflicting interests their knowledge must, in many instances, have been of immense service to the gas industry. Yet again they both deserve our thanks for devotion to the industry.

We also would offer our sincere congratulations to the officers of the Committee who have been closely associated with the preparation of the report. We agree with the Committee that they were "singularly fortunate in securing the services of Dr. E. W. Smith, F.I.C., the Technical Director of the Woodall-Duckham Companies, as our Hon. Technical Advisor." The gas industry, too, have been singularly fortunate that Dr. Smith was able to devote so much time to this work. He brought to the investigation an unsurpassed knowledge of the technical and economic aspects of the gas and coking industries. We also feel that the Committee have been particularly well served by their Secretariat, Mr. R. J. Moffatt and Mr. D. Haigh, upon whom have fallen the arduous labours in connection with correlating the evidence, and compilation of a most valuable technical report. It certainly should be closely studied by all who are interested in the future of the gas industry.

Gas Drying at Neath.

A week ago another detailed description of the operation of a Holmes "Dri-Gas" plant was presented to the industry, when Mr. W. Clark Jackson, of Neath, recounted his experience of a combined water and naphthalene plant which has been operating at the Neath Gas-Works for twelve months. Mr. Jackson's paper was read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, and, together with the discussion on it, is published in the "Journal" to-day. The plant is positioned at the inlet to the station meter, an unusual situation which is explained by the fact that the meter is a "Connersville." The holders are, of course, oil-filmed.

There are at least two very interesting features about Mr. Jackson's paper, for which the industry is indebted. The first is that the author, realizing that the broad question of gas drying has already been discussed both near and far, supplements general information by particular facts and figures concerning a plant at present dealing with about 220 million c.ft. a year. He gives the cost of working this unit for a year, and shows its relationship with the costs of district complaints, due to naphthalene and water deposition, for the year preceding its installation and the year during which it was in operation. During its first year, the plant saved over £600—an amount which Mr. Jackson believes will be considerably increased during the next twelve months, for it took several months of the plant in use before the naphthalene and water which were lying in the district mains and services were cleared out.

This monetary saving, however, is only half the story. The other half is explained by the following quotation from the paper: I feel my own works have benefited tremendously by its use—not only in the actual monetary savings effected, but, much more important still, in the

additional confidence being reposed in the Gas Department by the public, on account of the removal of these three old troubles, water, naphthalene, and rust, which used to interfere so frequently with the gas supply. This confidence is reflected in the additional business turnover being obtained even in these days of trade depression.

The second feature of interest is the succinct way in which Mr. Jackson summarizes the advantages of dry gas. Distribution costs are lowered by the prevention of internal corrosion of mains and services, by the freedom from pumping of local syphons, by the reduced charges for upkeep and repairs of meters, and by the greater ease of locating leakages. More important still, dry gas is a guarantee of uninterrupted service, and it implies fewer road openings by the gas undertaking—a point which, as the author observes, is not a little appreciated in these days of intensive road traffic.

Club Facilities During Institution Week.

By kind permission of the Committee, all Corporate and Non-Corporate Members of the Institution of Gas Engineers attending the Conference from June 2 to 6 have been made Hon. Members of the Leeds and County Conservative Club, which has full facilities and is conveniently situated near the Town Hall. This arrangement has been made on the initiative of Councillor E. J. Clarke, the Chairman of the Leeds Gas Committee.

Information Bureau at Leeds and Harrogate.

Urgent correspondence intended for the attention of the Secretary of the Institution of Gas Engineers between Monday, June 2, and Friday, June 6, both days inclusive, should be addressed to Mr. J. R. W. Alexander, Secretary, the Institution of Gas Engineers, Room 108, Queen's Hotel, Leeds, the Conference Headquarters of the Institution. The Information Bureau will be situated in Room 105, the Members' Room in Room 100, and the Ladies' Room in Room 109 at the Queen's Hotel. There will also be (during the business sessions) an Information Bureau and a Secretary's Office in the Town Hall, Leeds, while a further Information Bureau will be maintained at the Harrogate Gas Office, Cambridge Street, Harrogate.

A Record Attendance of 1000.

From the figures sent to us by Mr. J. R. W. Alexander, the Secretary of the Institution of Gas Engineers, it is clear that the number of those who will attend the Leeds Conference constitutes a record. No fewer than 865 members and guests were registered as having indicated their intention of being present when the list was closed on May 19. Provision has actually been made for the accommodation of 1000, since it is anticipated that this figure will be reached without difficulty. The numbers of acceptances received for the chief events on the programme are as follows: Civic reception and dance, 607; Mrs. Shapley's "At Home," 221; visit to Leeds Gas Department and the University of Leeds, 440; visit to Temple Newsam, 225; visit to Wentworth Woodhouse, 242; tour in Wharfdale, 308; Harrogate luncheon, 280; and President's luncheon, 132.

Representation at Conferences.

Mr. H. E. Copp and Mr. J. R. Willis Alexander will represent the Institution of Gas Engineers at the World Power Conference in Berlin and at the French Gas Congress in Paris. Mr. H. E. Copp, Mr. H. C. Smith, and Mr. H. E. Bloor will represent the Institution at the Belgian Gas Congress and F.A.B.I. meeting in Brussels, and Mr. Alexander will represent the Institution at the Danish Gas Conference in Odense. Unfortunately, it has been found impossible to accept invitations which have been received to Gas Conferences in other Continental countries in June, since their dates coincide with the above gatherings or with the Institution of Gas Engineers' Conference in Leeds.

Institution Education Scheme.

In publishing the Examination Questions set at the recent Examinations held by the Institution of Gas Engineers, it is noted that with the resignation of Mr. Walter Hole on June 30, 1929, the Organizing Secretaryship of the Education Scheme fell into abeyance, and the secretarial work was discharged by a member of the staff of the Institution. As from May 13, 1930, however, the entire administrative and secretarial responsibility of the Scheme will be undertaken by the Secretary of the Institution (Mr. J. R. W. Alexander), to whom all communications should now be addressed at 28, Grosvenor Gardens, London, S.W. 1.

Congratulations.

A well-filled day was spent last Friday by a party of Press representatives who had been invited by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., to visit the Becker coke oven plant at the Smithywood Works of Thorncliffe Coal Distillation, Ltd., at Sheffield. On the journey from and to London they were in charge of Dr. E. W. Smith (Technical Director) and Mr. T. C. Finlayson, of the Woodall-Duckham Companies, who were joined by Mr. R. Ray on arrival at Sheffield. A short drive through pretty country terminated amid big patches of bluebells, which it was a surprise to find ran right up to the Smithywood Works. Here a warm welcome awaited the visitors, by Mr. W. Newton Drew, Chairman and Managing Director, and Lieut.-Col. H. W. Woodall, C.I.E., M.Inst.C.E., whom it a pleasure to congratulate upon having been appointed a Director of Messrs. Newton Chambers & Co., Ltd. Valuable information and much kind attention was also given by Prof. D. Hay, Agent, Newton Chambers & Co.; Mr. R. Miles, Manager of Iron-Works Department, Newton Chambers & Co.; Mr. G. J. Greenfield, Manager, and Mr. J. Sylvester, Assistant Manager, of Thorncliffe Coal Distillation, Ltd.; Mr. P. J. C. Bovill, Newton Chambers & Co.; and Mr. L. W. Gwyn, Assistant Secretary of Thorncliffe Coal Distillation, Ltd. To the full illustrated description of the extensive Becker oven installation which will be found in this issue of the "JOURNAL," it is unnecessary to add anything here. In the matter of operation, the plant may be left to speak for itself, as it certainly does from the constructional engineering point of view. In size the installation makes a big contribution to the resources of the coking industry.

Coke Oven Gas Supply in Belgium.

The subject matter of the above paragraph naturally brings to mind the speech delivered two days earlier by Colonel H. Le Roy-Lewis, C.B., C.M.G., D.S.O., as Chairman, at the annual meeting of the Imperial Continental Gas Association. This speech gave an engrossing account of gas and electricity supply problems in certain parts of the Continent, and all students of international affairs will carefully peruse it. At one point the Chairman described what he referred to as the most important step which has so far been taken towards the rationalization of the gas industry in Belgium—the formation of the Société de Distribution du Gaz (Distrigaz). He pointed out that a great deal of the gas at present produced by coke oven undertakings is utilized uneconomically because there is no satisfactory means of marketing it. It will be the function of this Company to purchase coke oven gas wherever available, and to undertake its transport to the centres of distribution. The Company have set before themselves the programme of eventually creating one vast gas network throughout Belgium. The first stage of this programme, which is already in hand, consists in laying a collecting main, linking up Mons and Charleroi with Antwerp and Brussels. A great deal of work has to be accomplished before the Company will be in full working order; but the day is looked forward to when it will no longer be necessary to manufacture gas in densely-populated centres, and when all local gas undertakings will purchase from this organization their supplies of gas in bulk.

Freedom from Restraint.

Those who realize the disadvantages of leading strings long after the risks attaching to extreme youth have passed, will note with a certain amount of envy another portion of Colonel Le Roy-Lewis's speech to the Imperial Continental

stockholders. So that it may be sure of receiving all the attention that it deserves, we repeat it here, and leave it to point its own moral. "The tariffs by means of which our profits have been earned are among the lowest in the world. Our average price at Antwerp for gas supplied for ordinary private consumption during last year, without any discount, was the very modest figure of 2s. 10d. per 1000 c.ft., or 7½d. a therm. For electricity at Brussels our average receipt was 2¼d. per unit for current for lighting, 1d. per unit for motive power supplied at low tension, and just under ¾d. per unit for current supplied at high tension. The extreme moderation of these prices proves that the exaggerated control to which public utility companies are subjected in England does not achieve the object which it has in view; for we, while operating under a system which, although not without restraints, gives public utility enterprises much greater latitude than exists in this country, are able to supply gas and current at lower prices and still earn a fair rate of remuneration on our capital."

Forthcomimg World Power Conference.

As was expected would be the case, the Berlin meeting of the World Power Conference, which after an interval of six years is to hold its second plenary gathering next month, has evoked great interest in all countries. In order that the scientific objects to which the meeting is chiefly devoted may not be jeopardized, only a limited number of participants can be accepted; and in view of the possibility that the membership lists may have to be closed before the date already arranged, it is advisable to forward applications without delay to the Managing Bureau, Ingenieurhaus, Berlin, N.W. 7, in order that those interested in the proceedings may not lose the opportunity of taking part. The representatives of no less than 36 countries are to participate in the proceedings, and over 400 papers have been received. These have been summarized in 34 general reports, drawn up by German experts.

Personal.

RETIREMENT OF MR. H. A. STIBBS.

Owing to continued ill-health, Mr. Herbert A. Stibbs has found it necessary to resign, from June next, his position as Secretary to the Portsmouth Gas Company.

Mr. Stibbs has been associated with the gas industry for upwards of forty years, having commenced his career in the Offices of the Cardiff Gas Light and Coke Company, to which Company his father, the late Mr. John Stibbs, was for some years the Secretary. He left Cardiff in 1905 to take up the appointment he is now relinquishing at Portsmouth.

During Mr. Stibbs' 25 years' connection with the Company, its development and progress have been most gratifying, the number of consumers having more than doubled, rising from 32,417 to 66,079, while the output of gas, notwithstanding severe competition from the Corporation electricity supply, has increased by over 125 p.ct. Mr. Stibbs realized many years ago the necessity of up-to-date and efficient showrooms, where the most modern gas appliances and apparatus could be demonstrated and displayed to the best possible advantage. In this matter he had the full co-operation of the Directors and of the then Engineer and General Manager (Mr. J. D. Ashworth), and in 1914 the Chief Offices and Showrooms, erected in 1877, were replaced by the present modern structure, embodying all the latest features, and which, at the time of their erection, were generally considered to be the finest showrooms in the south of England.

A considerable amount of work devolved upon Mr. Stibbs in 1925-26, when Parliamentary powers were sought and obtained to take over the adjoining Undertakings of the Havant and the Emsworth Gas Companies, generally to extend the Company's area of supply, and to convert and consolidate the five classes of shares, forming the capital of the Company, into two classes of stock.

The sympathy and consideration of Mr. Stibbs for the staff and employees are reflected in the interest he always took as one of the Presidents of the Company's Social and Athletic Club, and also by the fact that, so long ago as 1910, he was the pioneer in obtaining the sanction of the Directors to the establishment of a Staff Superannuation Scheme. More recently—in 1924—with the Engineer (Mr. Thomas Carmichael) he took an important part in the inauguration of a Pension Fund for Workmen, in addition to a scheme of insurance covering the lives of those employees who have served the Company for more than five years.

For the past three or four years Mr. Stibbs has been Chairman of the South Western Tar Distilleries, and represented that body on the Council of the British Sulphate of Ammonia Federation. He was also a Member of the Management Committee of the National Gas Council and of the Executive of the British Commercial Gas Association.

Mr. Stibbs has been in indifferent health for some months past, and his host of friends in the industry will join with the Directors and employees of the Portsmouth Gas Company, and with ourselves, in wishing sincerely that, in the absence of business responsibilities, he may be fully and very speedily restored to health, and thus be enabled to enjoy his retirement for many years.

The Directors of the Scarborough Gas Company have appointed Mr. A. Philip Allan (Manager and Secretary) to the position of Engineer and General Manager of the Company; and Mr. J. W. Malton (Assistant Secretary) to the position of Secretary.

We learn with regret that Mr. A. Gregory, President of the Eastern Counties Gas Managers' Association, was taken seriously ill on Wednesday last, and had to be moved to the Harwich Hospital immediately for an operation for appendicitis. It is with pleasure, however, that we are able to state that he has come through the operation successfully, and is making satisfactory progress. He appeared to be in the best of health at the meeting of the Association at Harwich on May 16.

Brother J. R. Willis Alexander will be installed Master of the Ardingly College Lodge, No. 4410, to-day, by Worshipful Brother the Rev. T. E. Wilson, Assistant Grand Chaplain, at the Holborn Restaurant, London.

Mr. Leslie Beaumont, son of Mr. Percy Beaumont, of W. G. Beaumont & Son, Priory Works, Bow, is seriously ill, having undergone a very trying operation.

Correspondence.

[We are not responsible for opinions expressed by Correspondents.]

Control of Vertical Retorts.

Sir,—May I call your attention to an error in your report of the discussion on Mr. Kendrick's paper at Newcastle-on-Tyne. I refer to the meeting of May 2, reported in the "Journal" for May 7. I am represented as saying that "the continuous retort was subject to greater control than the intermittent retort," whereas the reverse opinion was expressed. If I may state my view here, it is that continuous vertical retorts are not simple to control unless selected coals—not too small in size or strongly caking—are used.

Now that Mr. Kendrick has referred in a letter to the other matter of the supply of air under pressure, I would add to my previous remarks that it is certainly bad to have a higher pressure in the combustion space than in the retorts, whether this results from positive pressure in the flues or merely from "pulling" on the retorts. The result in either case is the same—*i.e.*, an increase of gas volume obtained at the expense of high inert content, and the probable destruction of gas therms by burning of some hydrogen and other combustible gas. It is increasingly recognized that, of two evils, it is worse to lose therms in this way than by outward leakage into the flues.

Mr. Kendrick's ideal of a "balance" between internal and external pressures is, of course, very desirable, and should be more easily attained where the internal pressures are fairly uniform throughout the retort. It would not be questioned that the latter condition is more characteristic of intermittent retorts than of the continuous type.

L. H. Sensicle.

Gas Chambers and Coke Ovens, Ltd.,
Artillery House, Westminster, S.W. 1,
May 26, 1930.

Willenhall Public Lighting.—The Willenhall Urban District Council have accepted the tender of the Willenhall Gas Company, amounting to £1238, for public lighting during the coming financial year.

Cookery Demonstrations at Neath.—Demonstrations by Miss H. Curle, of Falk, Stadelmann, & Co., Ltd., on their "Bakerloo" cooker and their "Glide" iron have been given at the Neath Corporation Gas Department's showrooms in Neath and Briton Ferry. A wide interest was created in these appliances, and after the first day or so in each showroom the stock of "Glide" irons had been completely sold out, and a dozen orders taken for the cooker. The demonstrations lasted a fortnight—a week at each town. The luncheons and cakes that were cooked were given to poor families of the town mentioned by the Mayor of Neath, Councillor George Gethin, J.P., who is a member of the Gas Committee. The Mayor expressed his thanks for the gifts.

In To-Day's "Journal."

Report of Area Gas Supply Committee.

Comments on this report, which has just been published, appear on earlier pages.

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Markets Page.

Our "Market and Industrial" feature will be found on p. 522 of this issue.

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Financial Exploitation of "Coalite."

Mr. J. H. Brearley writes on this subject, criticizing in no uncertain terms an article by Mr. Andrew Still which appeared recently in the "Investor's Review."

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Institution Education Scheme.

The questions set in the 1930 examinations in Gas Engineering (Ordinary Grade, Higher Grade, and Diploma) and Gas Supply (Ordinary Grade and Higher Grade) are published.

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Rationalization of the Gas Industry.

Mr. George Evetts, in the first of a series of articles on this subject, deals with the general considerations applicable to the gas industry, and with methods of rationalization from without and from within.

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Cape Town Gas Company.

A large increase in gas sales, and an increase in revenue on this account, were announced at the annual meeting of the Cape Town and District Gas Light and Coke Company, Ltd., when a dividend of 8 p.ct. was declared for the year ended Dec. 31 last.

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Wales and Monmouthshire Institution.

The twenty-fifth annual meeting of the Wales and Monmouthshire District Institution of Gas Engineers and Managers was held in Caerphilly on Wednesday, May 21—Mr. Barton Grainger presiding. The President for the ensuing year is Mr. Octavius Thomas, of Pentre, who is also the Hon. Secretary of the Institution.

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Montevideo Gas and Dry Dock Company.

The Fifty-Eighth Ordinary General Meeting of the Montevideo Gas and Dry Dock Company was held on May 20—Mr. Frank H. Jones, M.Inst.C.E., presiding. A dividend at the rate of 4 p.ct., free of income-tax, was declared, making, with the interim dividend previously paid, 7 p.ct. for the year. An Extraordinary General Meeting followed at which the resolutions set out in the "JOURNAL" for April 30 (p. 251) were proposed and adopted.

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Coke Oven Plant for Town Gas Supply.

An illustrated article is published of a new bye-product coking plant recently installed at the Smithywood Works of Thorncliffe Coal Distillation, Ltd. The ovens are of Becker design, and the installation has a carbonizing capacity of 1200 tons of coal per day. The complete bye-product coking installation was designed and erected by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd. The plant was put to work in September, 1929, and is now producing each week approximately 5800 tons of coke, 97 tons of ammonium sulphate, 68,000 gallons of tar, 29,600 gallons of crude benzole, and is supplying 28 million c.ft. of debenzolized gas to the Sheffield Gas Company, with an average calorific value of 538 B.Th.U. per c.ft.

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Electrical Fusion of Gas Pipes.

At a meeting of the Manchester District Institution of Gas Engineers and Managers, Mr. H. C. Widlake, A.M.I.E.E., an acknowledged authority on the subject, introduced a discussion on the electrical fusion of gas pipes. There is no doubt, stated Mr. Widlake, that under certain conditions the dual use of gas and electricity by the same household may result in the creation of a dangerous state of affairs, and it is equally certain that, if gasfitters are trained to identify these conditions, much can be done to eliminate the risk of fire. The vague order which warns gasfitters against allowing gas pipes and electrical conduits to touch each other, and instructs them to fit spacing pieces of insulating material, is all right as far as it goes, but it is desirable that it should be supplemented by knowledge on the fitters' part as to what constitutes a dangerous state of affairs.

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Industry and Direct Taxation.

Replying to the toast of "British Commerce and Industry," proposed by Mr. F. W. Goodenough, C.B.E., who presided at the annual luncheon of the Incorporated Society of British Advertisers, Lord Melchett stated that one thing which was having a very depressing effect was the unreasonable amount of direct taxation on commerce and industry. Theoretical economists continually said that direct taxation did not affect industry; but the fact remained that it did. The reasons were both economic and psychological. The individual saw the reward of his work disappear in the maw of the Chancellor of the Exchequer. He himself had found that he worked six months of the year for nothing at all. He thought the period was even longer now. He was becoming more of an amateur than a professional. [Laughter.] The stimulus to carry on industry was being taken away.

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Gas Dehydration.

A Holmes "Dri-Gas" and naphthalene plant has been in operation at Neath for twelve months. Mr. W. Clark Jackson, Engineer and Manager to the Neath Gas Department, explains the beneficial effect which its working has had on distribution costs. Here is an extract from his paper: "The plant was put to work at the beginning of May, 1929, and by the middle of June district conditions with regard to both naphthalene and water troubles began to show considerable improvement. By the end of July water troubles had practically vanished, and naphthalene troubles were clear so far as the centre of the town was concerned, and were only showing on the outskirts. By the end of September all signs of naphthalene throughout the district mains and service pipes had disappeared, and no trouble from water was experienced, excepting at about six different places where, upon investigation, it was found that the water trouble was due to defective joints on the gas main itself or defective service pipes, which were allowing the water to filter through to the gas main. The past winter has been one of the easiest, from a distribution point of view, that the Department have ever experienced, there having been a total absence of the usual previous complaints due to naphthalene blockages and water troubles." The paper was read and discussed at a meeting of the Wales and Monmouthshire District Institution last week.

The Proposed Coke Convention Shelved.

A fortnight ago we reported an attempt which was being made to negotiate a convention between English and Westphalian coke producers to regulate the export of foundry coke to the Scandinavian market. Meetings between the interested makers and representatives of the importers were held last week at Copenhagen, but they appear to have been marked by agreement on no single essential point. Apparently it was suggested that a fixed cartel price of 20s. 6d. to 21s. should be made, while the current market value is around 17s. 6d. to 18s. Seeing that the supporters of the scheme did not by any means include all the producers in this country, and that quantities of coke are made in Belgium, Holland, and Poland, it is not surprising that no agreement was arrived at. In fact, one report has it that, while the discussions were proceeding, 65,000 tons of Belgian coke were sold to Scandinavia at market rates, or 3s. below the suggested cartel price.

Topical Items.

Ministry of Health Inquiry at Barrow.—A Ministry of Health inquiry into the application of the Barrow Town Council for sanction to borrow £47,100 for certain works in connection with the proposed centralization of the gas-works at Salthouse will be held on Tuesday, June 3, at Barrow Town Hall.

Gas Service.—An address on gas service in relation to fuel conservation and smoke abatement was delivered by Mr. N. B. Thompson, Engineer and Manager to the Skipton Gas Department, on May 21 to the recently-formed Skipton Rotary Club. Mr. Thompson is a founder member of this club, and the address was the first to be given by a member of the club.

New Rugby Stock Issue.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Rugby Gas Company, £15,000 6 p.ct. redeemable preference stock, to be redeemed at par on July 1, 1850. The minimum amount of stock which may be tendered for, or will be allotted, is £50. Above this, tenders may be in amounts or multiples of £1. Tenders for this issue must be received not later than 11 a.m. on Tuesday, June 3.

Annual Report of the Whessoe Foundry Company.—The tenth annual report of the Whessoe Foundry and Engineering Company, Ltd., shows a profit on the year's working of £37,324, which after deducting the usual expenses, leaves unappropriated profit of £28,093. Add to this the amount of £5625 brought forward from the previous account, and the sum available for distribution stands at £33,718. Out of this the Directors recommend the payment of a dividend at the rate of 17½ p.ct., leaving to be carried forward the sum of £6593.

Satisfactory Surplus at Glasgow.—At a recent meeting of the Glasgow Corporation Gas Committee, the General Manager reported that the revenue and expenditure of the Gas Department for the portion of the financial year up to the end of January last shows approximately a surplus of £47,789; that the estimates for the year 1929-30, submitted in August last, showed a surplus of £106,907; and that the prospects for the remainder of the financial year indicated that this figure might be reached. The Committee recommend that meantime no alteration be made in the present scale of charges.

Presentation to Captain W. J. Liberty.—On his retirement from the Secretaryship of the Association of Public Lighting Engineers, the Council are making a presentation to Capt. W. J. Liberty, in recognition of the splendid services he has rendered to the Association since its inception. In response to a desire which has been expressed, Mr. S. B. Langlands, the President, would like to afford to any member of the Association who desires to contribute an opportunity of doing so. Subscriptions will be gladly received and acknowledged by him; and he would rather have many small than few large contributions.

New Showrooms Opened at Castleford.—New showrooms and offices for the Castleford and Whitwood Gaslight and Coke Company were opened on Monday by Mr. W. M. Mason, Manager of the British Commercial Gas Association, after a luncheon given by the Directors to representative residents of the town, the chief consumers in the district, and many managers from adjoining towns. Mr. W. T. Cliffe, J.P., Chairman of the Directors, presided. The town and trade of Castleford was toasted by Mr. T. H. Elliott, Director and General Manager of the Castleford and Glass Houghton Collieries, and was responded to by Mr. H. Robshaw, J.P., Chairman of the Urban District Council, both of whom spoke in appreciation of the new enterprise.

South African Lighting Association Report.—The Directors of the South African Lighting Association, Ltd., in presenting the accounts of the Association for the year 1929, report that the improvement in the profits anticipated a year ago has been effected. This has been brought about by greater efficiency in manufacture, and by economies in labour, reducing the cost of coal and wages. For this result credit is due to Mr. Gardner Pennington, the Engineer in South Africa. The expenditure on renewal of plant has borne fruit, and there has also been some increase in the sales of gas at Port Elizabeth, while the Grahamstown Undertaking has held its own in the face of keen competition. In view of the improved working at Port Elizabeth, the Directors have authorized a reduction in charges there to take effect from March 31, 1930. After payment of debenture and other interest charges, there remains a balance for disposal on profit and loss account (including the sum of £4230 19s. 4d., brought forward from 1928) of £9931 11s. The Directors now propose the payment of a dividend for the year at the rate of 5 p.ct., less income-tax at 2s. 6d. in the £, and to carry forward to the year 1930 £5431 11s.

Cheaper Gas for Cork.—The Directors of the Cork Gas Consumers' Company announce that after the next Mid-Summer quarter meter reading the price of gas to general and slot consumers will be reduced by 1d. per therm—or the equivalent of 5d. per 1000 c.ft.

Bradford Donation for "Fairy Gas" Competition.—The Bradford Corporation Gas Committee has decided to allocate the sum of £10 for the provision of prizes to be awarded locally in connection with the "Fairy Gas" Competition organized among school children by the British Commercial Gas Association.

Southampton Stock Issue Over-Subscribed.—The issue of £100,000 5½ p.ct. preference stock by the Southampton Gaslight and Coke Company was substantially over-subscribed, and investors who tendered at the minimum price of £97 10s. per £100 stock received partial allotments. The average price realized was £98 0s. 8d. p.ct.

Low-Temperature Carbonization.—The Fuel Research Board has invited all companies engaged in low-temperature carbonization of coal to send representatives to attend a conference on the subject. The meeting is convened for the morning of May 30, at the Offices of the Fuel Research Board, Westminster, for a discussion on technical points.

Fifty Years' Progress in Trade Journalism.—To commemorate the Jubilee of Benn Brothers, Ltd., of Bouverie House, Fleet Street, a special supplement has been produced with ten of the firm's leading trade and technical journals. This publication traces the growth of the concern from the time when the first number of the first Benn journal was published in July, 1880. The progress and development of the various Benn journals are dealt with in turn, and altogether the supplement makes very interesting reading.

Meters, Ltd., Manchester.—The Directors of Meters, Ltd., Manchester, submit the following accounts of the Company for the year ended March 31, 1930. The net profit for the year amounts to £20,310 19s. 7d., which, added to the balance of £5341 2s. brought forward, gives a total of £25,652 1s. 7d. After deducting the interim dividends amounting to £6885 6s. 10d. paid in November last, the amount now available for appropriation is £18,766 14s. 9d. The Directors recommend (*a*) the payment of final dividends for the year ended March 31, 1930, of 2¾ p.ct. (actual) upon the preference shares, and of 6½ p.ct. (actual) upon the ordinary shares, making the total dividends for the year 5½ p.ct. upon the preference shares and 9 p.ct. upon the ordinary shares (both *less* income-tax); and (*b*) that the balance of £5899 14s. 3d. be carried forward to next year's accounts.

A Fine Example of Gas Lighting.

The following is an extract from an editorial comment on "Arterial Road Lighting" which appeared in last Friday's "Tottenham and Edmonton Weekly Advertiser."

"The 'Safety First Week,' now drawing to a close, has, we hope, aroused the public conscience to realization of the vital importance of the subject; and assisted in focussing attention upon matters related to protection of life. In these suburbs the evil reputation attaching to the too generally unlighted arterial roads marks out that particular business as calling urgently for immediate attention in responsible quarters. We are only too well aware that to excessive speed, as well as absence of illumination, in certain sections, most of the many casualties and fatalities are directly due. Magistrates, and others, have frequently condemned the practice of turning the new thoroughfares into racing tracks. That homicidal user, however, persists; and, with the elimination of the speed limit, the probability is that safety will still further be discounted, and the case for adequate lighting correspondingly strengthened. To its credit, Tottenham District Council set the example, several years ago, to other local authorities, by installing an excellent system of lighting in the southernmost section of the Cambridge Road. Trial was made both of gas and electric lamps, and the former method gained the verdict. To-day the arterial road in the Tottenham area is plentifully studded with gas standards."

Approximately eleven miles of the Great Cambridge Arterial Road pass through the Tottenham and District Gas Company's area of supply. The road is under the control of the Tottenham, Edmonton, Enfield, Southgate, Wood Green, and Cheshunt Councils, each of whom has a section coming within its own particular area. Up to the present the Company has been fortunate in securing the whole of the lighting in the Tottenham area, and other sections of the road are now being considered by the various Councils with a view to lighting them by means of gas.

XUM

Pensions for Gas-Workers.

Life pensions have just been granted to twenty-three co-partners of the South Metropolitan Gas Company. In the aggregate their service amounts to 550 years, or an average of nearly a quarter of a century, while their combined ages cover 1500 years. It speaks well for the conditions of their employment and the high standard of health among the workmen that the youngest pensioner to be retired is 59 years of age, while the oldest is seventy.

Four of the veterans—a labourer, a crane-driver, a foreman, and a stoker—have served the Company for more than forty years.

The South Metropolitan Gas Company have a system by which a committee of workers investigate any accidents that occur in connection with their employment; and their recommendations are generally put into force. This system serves as an additional security for the Company's 10,000 employees.

Second International Benzole Conference.

This conference, convened by the National Benzole Association, Buckingham Gate, S.W. 1, will be held at the Grosvenor House Hotel, Park Lane, W. 1, on Friday, May 30, under the Chairmanship of the President, Sir David Milne-Watson, LL.D., D.L.

Delegates from the leading countries of Europe will attend the conference, and important papers will be read. Discussions will take place in connection with the marketing, propaganda, and distribution of the benzole produced in the respective countries.

The National Benzole Company, Ltd.—which is closely associated with the National Benzole Association—is the sales organization owned and controlled by the British benzole producers, and was the pioneer in the introduction of benzole as a motor fuel in this country.

Belfast Report Shows Substantial Profits.

Substantial profits are again revealed in the annual report of the Belfast Gas Undertaking, and in tribute to the Engineer and Manager, Mr. J. D. Smith, M.Inst.C.E., J.P., the Gas Committee have recommended the Corporation to increment his salary by £250 per annum. The gross profit on the manufacture and sale of gas and residuals for the year ended March 31 was £147,206, being a decrease of £19,197 as compared with the previous twelve months. This decrease was almost entirely due to the fall in the amount realized for tar and other chemical products, and also to a decrease in the amount received for coke. The gross profits have been higher in only two previous years—1928 and 1929.

"Our working results are worthy of attention," says Mr. Smith in his report. "The revenue from the sale of gas and from the Stove Department shows an increase of £11,198. We had a decrease in expenditure for gas oil of £3147, due to our having been able to make a purchase on favourable terms. We had also a decrease in expenditure in connection with our water gas plant of £3713, coal gas purification £382, repairs and maintenance of plant £884, repairs mains £566, repairs meters £324, as well as many other smaller items. On the other hand, owing to our having carbonized 7011 tons of coal more than in the previous year, we had an increase in expenditure for coal of £7746, and for carbonization £2066, and increases for repairs and maintenance of stoves £5551, and for automatic system £3041. The gas made amounted to 4206 million c.ft—an increase over the previous year of 159 millions, which is equal to 3·94 p.ct. Of this total 71·68 p.ct. was coal gas and 28·32 p.ct. water gas. We carbonized 175,790 tons of coal—an increase on last year of 7011 tons. The price paid in both years was substantially the same. It is, however, in the gas made per ton of coal that a substantial advance has to be recorded, our make per ton this year being 17,153 c.ft., as against 16,745 c.ft. in 1929. Twelve months ago I reported that we had made a record in this respect, and this good work has been continued this year and a further advance made.

"I also reported last year that a substantial reduction in the cost of manufacture of gas had been made, and it is therefore very gratifying to be able to report that this year we have further reduced our manufacturing costs by 0·734d. per 1000 c.ft. of coal gas, and 0·932d. per 1000 c.ft. of water gas. Many new consumers have been obtained, as we fixed during the year 1421 new ordinary meters and 1952 automatic meters. The meters now in use amount to a total of 101,078. Although we have had a further drop in revenue in the chemical department, this result was expected owing to market conditions. Our net revenue amounted to £64,468."

What British Commerce and Industry Need.

Proposing the toast of "British Commerce and Industry," coupled with the name of Lord Melchett, on Wednesday last, at the annual luncheon of the Incorporated Society of British Advertisers, Mr. F. W. GOODENOUGH, C.B.E. (who is a Vice-President), said he knew how greatly their President, Sir Hugo Hirst, regretted his inability to take the chair at that luncheon to Lord Melchett. Nothing but urgent business abroad would have prevented his being there. He (Mr. Goodenough) greatly appreciated the honour he had done him in asking him to take his place. It was pleasant evidence of the good relations that existed between those who were very keen competitors in business. Sir Hugo was one of whose friendship any man might well be proud. They wanted such men as their President in commerce and industry to-day, and their guest, Lord Melchett, whom they were so glad to have with them—and many more of them; men of vision, initiative, enterprise; of outstanding intellect, of inexhaustible energy, and of indomitable courage.

In these critical days in industrial history, continued Mr. Goodenough, he was not a pessimist; he was an optimist. But he was one who believed that optimism consisted in facing the stark facts with hope and courage—not in hiding facts and fears behind an assumed air of lightheartedness. They were going through a bad time; they were not getting the share of the world's import trade they used to have—and to some extent that was their fault, as well as to some extent their misfortune. He had been upbraided for saying so, and told he was preaching defeatism, disheartening their salesmen, and encouraging their competitors. He was afraid that he had very little respect for that view of his fellow-countrymen's good sense and courage, or of the intelligence of their competitors, who certainly were aware of the facts of the case whether they discussed them openly or not.

As he had said, he was a great believer in knowing the worst, in examining themselves and their methods frankly and fearlessly, with the one end in view of putting right what was wrong as quickly as possible, and so making full use of their experience.

"What we need in commerce and industry to-day more than ever," continued Mr. Goodenough, "are first and foremost leaders of genius at the head, who will bring new minds to new problems; men who readily recognize that (in Henry Ford's words) 'changed conditions give old methods notice to quit,' and have the penetrating insight, foresight, and judgment, as well as the knowledge, needed for devising new methods on great lines. Then we want men with the qualities of leadership and organization—that is, men of character, talents, and education—to direct policy evolved by the men of genius; well-educated and skilfully trained officers and men to put policy efficiently into daily action; and goodwill right through all ranks engaged in the enterprise."

Lord MELCHETT, responding, said that one thing which was having a very depressing effect was the unreasonable amount of direct taxation on commerce and industry. Theoretical economists continually said that direct taxation did not affect industry; but the fact remained that it did. The reasons were both economic and psychological. The individual saw the reward of his work disappear in the maw of the Chancellor of the Exchequer. He himself had found that he worked six months of the year for nothing at all. He thought the period was even longer now. He was becoming more of an amateur than a professional. [Laughter.] The stimulus to carry on industry was being taken away. They wanted commerce and industry to be carried on by happy and cheerful people. A dissatisfied staff or dissatisfied workman would never make for efficient work or progress and would never make for low costs of production. There were many assets in business balance-sheets which no acountant had yet discovered. There were the great assets of comradeship, loyalty, and team work. All these helped a great deal. There were certain principles which stood out in industry and commerce; the principles of a large, united, rationalized industry; the latest and best technical methods; aggressive, solid, and well-informed salesmanship; and co-operation of all engaged in the business from top to bottom. These were fundamental, and no temporary depression could succeed in affecting them. They would always win through.

Advertisements formed the most interesting portion of the literature he saw to-day. A good deal of the advertising reflected more credit on the artistic instinct of the designer than on the result he was likely to achieve. He emphasized the need for more and more technically-equipped salesmen. This country was essentially a country of high-class production. Our goods might be more expensive, but they gave us immense goodwill throughout the world, a goodwill that suffered when times were hard, but which came back immediately times were better. It was better to go through difficult times than to give up goodwill. Goodwill took generations to build up, and nothing could be lost quicker if the standard of quality was reduced.

The toast of "The Society" was proposed by Mr. SYDNEY WALTON and responded to by Mr. A. W. FISHER.

Ruhr Gas Developments.

Further considerable extensions of its operations in the long-distance transmission of gas direct from the coal mines to consumers are reported by the Ruhr Gas Company, the co-operative enterprise formed by the leading coal and steel concerns of Germany as part of their scheme of post-war rationalization. About 185 miles of new piping, it is stated, were laid last year, conveying the gas to cities as far distant from the Ruhr as Hanover. In all, 465 miles of gas piping are now in use supplying 55 cities, and some of the biggest heavy industries of Germany.

The Ruhr Gas enterprise, whose initial operations were financed by American capital raised by Dillon Read & Co., of New York, invested £1,450,000 in extensions of its activities last year, and distributed about 400 million cub.m. of gas, in comparison with 110 million cub.m. during the previous year. Daily deliveries amounted during April, 1930, to an average of 2 million cub.m., and monthly receipts from the sale of gas, it is stated, are at present almost twice as great as for the corresponding period of last year.

The total loss of £178,829 shown in the balance-sheet—including a loss of £80,989 on last year's working—is officially explained by the fact that the bulk of the gas so far delivered has been to industries belonging to the Ruhr Gas group, including the German Steel Trust, which only pay transport costs for their supplies. Contracts have recently been concluded with big industrial cities such as Cologne and Dusseldorf, which are expected to prove more profitable.

Notes from Scotland.

New Holder for Denny.

The Denny Town Council have received a grant for the erection of a new gasholder at Banknock, the only condition attached to the grant being that the work shall be started before June 30 and completed within four months from that date.

New Plant at Aberdeen.

Councillor Gatto, Convener of the Gas Committee, inaugurated new plant last week at the Aberdeen Gas-Works. The plant was installed at a cost of £90,000, and consists of 29 Woodall-Duckham vertical retorts, capable of producing 4½ million c.ft.

Newburgh Company's Dividend.

Provost Anderson presided at the meeting of the Newburgh Gas Light Company, when the Clerk (Mr. James M'Kinlay) submitted the accounts for the year. The financial position was considered satisfactory, and the Directors recommended that a dividend of 7s. 6d. per share (free of tax) be paid.

Free Cookers at Dundee.

The Dundee Gas Committee have asked the Gas Engineer and City Collector to submit a report on the subject of what effect the policy of supplying cookers and fires free to consumers has on the price of gas. Treasurer Frain, who moved that the report be asked for, said that they were desirous of arriving at such charges as would enable a reduction to be made in the price of gas. They wanted to know if they were distributing appliances too freely, and giving costly appliances where there was little consumption of gas.

Public and Domestic Lighting.

Last Wednesday the following letter was addressed by Mr. Frederick J. Gould to the Mayor of Bath, Mr. Aubrey Bateman:

The only justification I can offer for addressing this letter to you is that I am a native of Bath (an old Edwardian) and particularly interested in domestic and public lighting, both at home and abroad.

I saw it reported in the "Bath and Wilts Chronicle and Herald" that, when you opened the Exhibition of Commerce and Industry at the County Rink on the 10th inst., when referring to gas and electricity for lighting purposes, you stated: "In spite of the fact that electric light is almost universal for street lighting. . . ."

Now, Sir, will you permit me to correct that statement, and offer you my assurance that approximately 75 p.ct. of street lighting in Great Britain is carried out by gas, and rightly so, from a point of both efficiency and economy!

A well-known lighting authority, Mr. H. T. Harrison, a few years since collected data relating to the lighting of all classes of streets and roads, and stated that 73 p.ct. of street lighting was by gas; and in another report given this year, which includes 317 well-known towns with a total mileage of 16,513 streets, it was found that 13,307 miles were lighted by gas. This is a much larger proportion than I have already given, but it shows the modern tendency where efficiency and economy are required.

May I instance just two recent decisions with regard to gas as a modern illuminant? Early this month the Lewisham Works and Highways Committee, after testing one mile each of the main road to Hastings with gas and electric lighting, came to the conclusion, after one of the most equitable and satisfactory trials ever given to the rival illuminants, to recommend that the Council of the Borough of Lewisham should adopt gas as the standard lighting for all main roads in the Borough over 50 ft. in width; and this recommendation has now been adopted.

The other example refers to the new arterial road from London to Cambridge, which is eleven miles long. Here again, both the gas and electrical undertakings were given an opportunity of showing what they could do; and after two years' test, the authorities decided in favour of gas. At the moment, 2½ miles have been lighted and they give a very fine example of modern gas lighting.

My native city has much to learn in this respect. Your Council, for some reason, have lately chosen electricity, and some of the streets are very poor examples of lighting! I notice that in many cities where the electrical undertaking is municipally owned, the Councils decide to instal electric light regardless either of the cost or of the ratepayers' interest. The Gas Undertaking at Bath supply their commodity at such an extraordinarily low figure that I feel convinced a very substantial reduction could be made in the rates if gas were used throughout for lighting the city and outer Wards.

I would like to suggest, Sir, that our beautiful city should not be spoilt by the lack of artistry in the design of standards used from which the illuminant is suspended. Those erected in Milsom Street and other fine thoroughfares have been severely criticized by visitors to my knowledge on more than one occasion.

Trusting you will accept my correction and with apologies for the length of my letter,

Yours faithfully,

(Signed) Frederick J. Gould.

P.S.—I am sending a copy of this letter to the Editor of the "Bath Chronicle and Herald" for publication, and I am also sending for your kind acceptance a copy of an address on the subject of "Gas Lighting" which I read at the Joint Gas Conference at the British Industries Fair, Birmingham.

Public Street Lighting.

Further Victory for Gas over Electricity.

Hardly is the ink dry which told of the great victory that had been achieved for gas by the centrally suspended lighting in the Hastings Road, at Lewisham, by the South Metropolitan Gas Company, than there has come to hand the intelligence that the same Company have secured a further victory by obtaining the public lighting of the main roads of the Metropolitan Borough of Deptford (the Company have already the lighting of the side streets).

Following the example of their neighbouring Borough of Lewisham, the Deptford Borough Council invited both the South Metropolitan Gas Company and the London Electric Supply Corporation (whose super-generating station is in the Borough) to submit competitive schemes for lighting the main roads. The South Metropolitan Gas Company replied by erecting central suspension lamps at New Cross and Lewisham High Road, and other situations. The London Electric Supply Corporation, for reasons given, declined to take part in the experimental or trial lighting. As a result of the experiment the South Metropolitan Gas Company submitted a comprehensive scheme of improved lighting for the main roads—viz., New Cross Road from Old Kent Road to Deptford Bridge, Lewisham High Road, and that portion of Queen's Road within the Borough, Douglas Street, and High Street, Deptford; a total of 118 high-power lamps.

At the meeting of the Borough Council on Wednesday last it was agreed that the scheme of lighting for the roads in question, as suggested by the South Metropolitan Gas Company, be adopted. The Borough Engineer has been authorized to make the necessary arrangements with the Company.

In addition, Margate tells of what is being done in the way of improved public lighting in that popular resort under the agency of the Isle of Thanet Gas Company, where the number of public electric lamps have been reduced to the negligible quantity of five.

To crown the list comes the news that Richmond is about to have an experimental centrally suspended system of high-power gas lamps installed in its area; a similar installation is being prepared for erection in the Edgware Road; while the Metropolitan Borough of Holborn have given permission to the Gas Light and Coke Company to instal centrally suspended high-pressure gas lamp in High Street (Holborn), Holborn, and Tottenham Court Road.

Education for Industry.

"Large firms are like little nations within the nation; they can utilize the work of people of all grades of training," said Mrs. Cloudesley Brereton, a Past-Chairman of the Association for Education in Industry and Commerce, when speaking on "Education for Industry and Commerce," at the annual dinner of the Efficiency Club on Thursday, May 22, at Vernon House, St. James'. "There is work which needs specialized training, work that needs a sound general education, and work that can be done better by people who are not too highly educated in the academic sense."

She pointed out that though there is a popular idea that British industrialists are behind those in America and in some European countries, this is largely a misconception resulting from our reluctance to brag about our good work. Works' schools had been in existence in this country for many years. One firm, a leading engineering firm, had started a works' school as long ago as 1873. In England the initial steps had been taken by individual firms, but these firms had often co-operated with each other and with the local education authorities. In the Association for Education in Industry and Commerce the member firms pooled the results of their separate experiences, with the result that boys and girls entering to-day on the adventure of an industrial or commercial life had wonderful opportunities before them.

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

May 30.—SECOND INTERNATIONAL BENZOLE CONFERENCE.—Grosvenor House Hotel, Park Lane, W. 1.

May 30.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—County meeting at Maidstone, at the Royal Star Hotel, 12.30 p.m.

June 2-5.—INSTITUTION OF GAS ENGINEERS.—Annual Conference in Leeds.

June 14.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Annual Meeting and outing, Dunfermline.

June 21.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Summer visit.

June 27.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the morning.

July 11.—MANCHESTER AND DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—Visit to the Bolton Gas-Works, and paper by Mr. Lomax.

Aug. 19 and 20.—IRISH ASSOCIATION OF GAS MANAGERS.—Meeting in Dublin.

Sept. 11.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Aberdeen.

Oct. 27 to 29.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting at Hull and Bridlington.

Financial Exploitation of Coalite Redivivus.

By J. H. BREARLEY, M.Inst.C.E.

Over ten years ago the writer put forward under a *nom de plume* two articles in which features of low-temperature carbonization were scrutinized, including the yield of products and the profits claimed for the process. He then said: "Millions of money have been spent in experimenting and in trying to found commercial success, but there is no recorded proof that any process has been brought to the point of stabilized profit-bearing." These words might just as truly be written to-day, though it can readily be acknowledged that progress has been made, upon the precise measure of which even the Fuel Research Board is careful not to make estimates.

The matter is once more brought to mind by a four-page reprint, in foolscap size, which the postman brought a few days ago. Its origin was indicated by the postmark and the printer's name. The document was a reproduction of an article which had appeared in the "Investor's Review" by "Andrew Still," and was headed "Coalite Carbonization Process: an established industry: demand for larger supplies: strong reasons for Government support." In glowing terms, "Coalite" is made to appear a veritable Klondike. There is no indication of "Andrew Still's" credentials. We are left guessing. He can hardly be a practising technologist, or he would surely have a little more of Uriah Heap in his constitution. To take him at "face value," we should have to accept it that the one and only thing which will save British mining, and even the British nation, from annihilation, is for the investing public forthwith to disgorge further millions in "Coalite" production, or, failing that, to induce the Chancellor of the Exchequer to apply the indirect method with which we are already too painfully familiar.

Britain at the present time urgently needs two things—(1) to get back from subsidization of any industry by Government, whether in the guise of unemployment relief or otherwise, and (2) stronger protection for the investing public. Each time financial resources are dissipated, whether they come from the public or private exchequer, the financial bulwark of the nation is weakened, and the amount of money for industries which have been tried and proved is lessened. It would have a salutary effect at the present time if the investing public could be as widely informed of the amount of money which has already been lost on the production of "smokeless fuel" as it is upon its alleged virtues. Mr. Still hazards no figures of this sort.

A DIP INTO HISTORY.

Avoiding its pathetic financial story, Mr. Still does venture tentatively into "Coalite" history. In a reference to the "Master Patent" of Mr. Thomas Parker, he says: "Incidentally in making 'Coalite' under the Parker process there is produced a large quantity of high-grade oil which can be converted into petrol, fuel oil, and other valuable products." With that claim we have a generation's familiarity, the certainty of which is only equalled by the uncertainty which persists as to the "value" which can be put on the products. Proceeding, Mr. Still says: "There were innumerable technical difficulties to be overcome before a thoroughly efficient system, such as is working to-day, was evolved." We may endeavour to find how far Mr. Still proves his point, to which end he draws figures from the works which have been established at Barugh and Askern, and gives estimates of what will ensue from the East Greenwich installation of the South Metropolitan Gas Company—viz.:

(1) *Barugh.*

160 "improved" retorts.
Full production reached July, 1928.
Coal used, washed smalls.
Total coal used to recent date, 136,720 tons.
Obtained.—Coalite, 95,704 tons.
Crude coal oil, 2,324,240 gallons.
Coal petrol, 273,440 gallons.
Gas (750 B.Th.U.), 547 million c.ft.

(2) *Askern.*

144 retorts.
Operations commenced July, 1929.
Coal used, washed smalls.
Present throughput, 1450 tons per week.
Potential throughput, 1820 tons per week.
1930 throughput (approx.), 83,000 tons, yielding "Coalite" 58,000 tons.
Crude coal oil, 1,411,000 gallons.
Coal petrol, 225,000 gallons.
Gas (rich), 332 million c.ft.

(3) *East Greenwich.*

180 "large" retorts.
Operations not yet begun.
Coal to be used, not stated.
Yield expected.—"Coalite," 70,000 tons.
Crude coal oil, 1,700,000 gallons.
Coal petrol, 275,000 gallons.
Gas (rich), 400 million c.ft.

THE FIGURES SCRUTINIZED.

An analysis of the foregoing figures gives the singular result that in all three cases the "Coalite" yield is exactly 14 cwt. per ton, and the "crude coal oil" 17 gallons. Clearly they are but paper estimates. The "coal petrol" at Barugh works out at 2 gallons, Askern 2·71 gallons, and East Greenwich 2·75 gallons per ton of coal. Assuming the "rich" gas of Askern is, and East Greenwich will be, 750 B.Th.U., as at Barugh, the yield in all three cases is 30 therms per ton of coal. Generalizations of this sort may be good enough for impressing investors, but technicians have seen more than enough of them. In 1930, as in 1919, we still await a balance-sheet which can be analyzed with the same exactitude as the published accounts of gas undertakings.

Incidentally, it is hardly believable that the South Metropolitan Gas Company will view with favour the prominence here given to its own "Coalite" activities. It will be soon enough to bring East Greenwich results into financial window-

dressing when these results accrue, and have the imprimatur for publication of the Company which has produced them.

The Askern Plant.

Mr. Still recounts a visit paid to the Askern works. He says: "I was shown the weekly statements of revenue and expenditure, and the daily consignments of 'Coalite,' all set out in complete detail." From this apparently superficial inspection, he gives the results of three weeks' working separately, the possible object being to suggest uniformity of results. Aggregated, the figures are:

Coal carbonized, 4137 tons.
Total costs of working, £2894.
Revenue, £5668.
Working profit, £2774.

These figures are stated to be "not the best expected." They work out at 14s. per ton for total costs, and £1 7s. 3d. per ton for revenue, leaving a working profit of 13s. 3d. per ton. Are we to believe that 14s. per ton will cover the total cost of coal, labour, repairs, and all the conglomeration of expenses which accrue on a carbonizing plant? It would be decidedly interesting to know what share "washed smalls" has in the total figure of 14s. Then there are standing charges, depreciation, and a heap of other items to bring into account before net profits are reached. Upon these Mr. Still is absolutely silent. The revenue of £1 7s. 3d. per ton, if it is a net figure after deducting all selling expenses, is a "lucky" result, and may only be a transient one, if users discover that satisfactory smokeless fuel can be got at much less cost.

Still another item upon which information might be yielded is as to the ash content of the "smokeless fuel" from "washed smalls." Apparently coal is sold to the plant at a very low price—not more than (say) 7s. per ton. Even if it is washed, it must have a big percentage of ash remaining, for it is inconceivable that the suppliers would sell really good coal, comparable with that which yields gas coke, at anything like 7s. per ton. If they are doing this, assuredly the Investigation Committees projected by the Coal Mines Bill will have something to say about it.

Mr. Still proceeds: "It is expected that by the end of the year a steady profit at Askern of from £1000 to £1200 per week will be earned." Here there is no qualification about the weekly balance being solely as at works, save for "overhead and establishment charges at head office," to which they are subject. Taking the lower figure of £1000, or a round figure of £50,000 for the full year of 1930 with its prophesied output of 83,000 tons, it gives a profit of about 12s. per ton, excluding the potential profit from the "Killingholme petrol plant" (see later), or from sale of gas "to a company for enrichment purposes" which would give a further 3s. per ton, if sold at "2¼d. per therm." We have yet to see the gas company which is prepared to pay anything like 2¼d. per therm for externally produced gas therms.

The Killingholme Petrol Plant.

The latest technical information we have regarding "crude coal oil" from low-temperature carbonization is that its proper place in commercial industry is yet undetermined. Its characteristics are still being studied in the laboratory, and no one seems to know with precision exactly what can be done with it, or what distillation or refining will be needed to ensure for it a stable and profitable market. The "Coalite" people, according to Mr. Still, have arranged for as much as possible of the oil to be converted into petrol by the Gyro Vapour Phase Process, "which has been eminently successful in the United States and Canada, but which has hitherto not been operated in this country." Petroleum Refineries, Ltd., are to take all the oil (Mr. Still says "coal," but he means "oil") produced, and treat it at Killingholme on the banks of the Humber, near Hull, "with an input capacity of 4000 barrels per day." Each ton of coal will give "about 18 gallons of crude oil . . . this will yield one-third petrol, or 6 gallons to the ton, which, at to-day's price, would be worth about 9s."

There are a good many "abouts" sprinkled over Mr. Still's story. With petrol retailing at 1s. 7d., which includes wholesalers' and retailers' profits, transport to retailing pump, &c., it is obvious that the 9s. will be *about* wide of the mark, even if the 6 gallons yield materializes, of which we have yet seen no evidence. This brings us to a rather important phase of the petrol tax, upon which some enlightenment is necessary.

The Petrol Duty.

As everyone knows, the Budget of 1928 imposed a duty of 4d. per gallon on imported petrol, from which home-produced supplies were exempt. Mr. Still puts it this way: "It was stated on behalf of the Government that the main object in view was to foster the refining industry in this country, and the plant now being erected by Petroleum Refineries, Ltd., was projected partly on this promise of Government encouragement. It would, therefore, be a serious blow to this young and promising industry if the duty were removed, but there seems little danger of that in the present condition of the national finances." Are we to understand that when crude oil is imported for refining here, the refined oil escapes the petrol tax? The present writer suggests that the general public believes it is only spirit distilled from the carbonization of coal—*i.e.*, benzole—that escapes the duty; the prime object being (1) to encourage home industries and (2) to give the country less dependence upon imports for its motor spirit.

If home refining of imported crude oil escapes the duty, there is no wonder that refining in Britain grows apace. Yet it puts the country in no greater independence from foreign sources for its motor spirit. The true aim is to encourage, as far as possible, dependence upon home sources for motor spirit, including the crude material from which the spirit is distilled. That can only be done by limiting the exemption from petrol duty to supplies produced from home raw materials. In so far as low-temperature carbonization helps that feature, it is entitled to all encouragement short of spoon-feeding, or of financial crises by being in too great haste to "get there."

If "crude coal oil" is to be distilled at Killingholme at a works which also refines imported petroleum, and the tax exemption applies only to coal products, protection will have to be provided against "juggling." This matter is of considerable concern to the home gas and coking industries, which, during the great war, by their accelerated output of tar oils, stood between the nation and defeat. *They* are entitled to preferential treatment not merely over imported "refined," but over imported "crude." If the petrol tax exemption applies to crude, it is also, incidentally, encouraging increased production of bitumen within these shores, in spite of the fact that there are already enough tar products to supply the full needs of the nation in the matter of highway construction and maintenance.

Mr. Still, even if his roseate estimate is realized of 6 gallons from crude oil and a further 2 gallons as "coal petrol"—*i.e.*, a total production of 8 gallons of motor spirit per ton of coal distilled—puts the claim for "Coalite" rather high when he assumes that this will secure our independence from overseas supplies. Were the whole of our domestic coal consumption of 40 million tons so treated, the total yield would be 320 million gallons. Last year we imported about 840 million gallons of motor spirit. Nothing short of successful hydrogenation of coal will put us in a state of total independence, and we seem nearly as far off that as ever. Yet Mr. Still, with "Coalite" production as his justification, says "we have the means of producing at home all the oil we require."

The "Government's Golden Opportunity."

Under this heading, Mr. Still suggests that the Government should initiate "a bold scheme where the results would be immediate and certain." He urges "the establishment of independent plants for manufacture of smokeless fuel at strategic points adjacent to the various coalfields and large centres of consumption," and also "the encouragement of some means for establishing small plants all over the country working in conjunction with gas-works and municipal services. All towns having gas-works and electricity stations could run 'Coalite' plants in conjunction therewith on a very economic basis, and the smokeless fuel would be of great value in every community by reason of the fact that it was smokeless, and was produced in a municipal plant from which it would share the profit." It is not Mr. Still's high-sounding phrases that will capture the adherence of gas-works, but an "economic basis" tried in the refining fire of experience. That explains why certain gas undertakings have elected to try-out processes for themselves. If these prove successful, others will follow by the ordinary process of industrial evolution, and it is quite unnecessary to trouble the Government about it. Mr. Still talks as if "Coalite" was the one and only smokeless fuel, whereas several million tons are already supplied by gas-works alone.

Mr. Still's advocacy of Government interference fits his glowing prospect of potential profits badly. Why does not the investing public "topple over itself" in an effort to get in on the "ground floor?" Surely a potential profit of 25 p.ct. should put them into queues for "Forms of Application." It must be because they have a dim recollection of having heard these tales before.

A Tale of Breeze.

We are informed that the amount of "breeze" produced at Askern is "rather high," ranging from 70 to 100 tons per week, although at an earlier stage of his story Mr. Still, describing the process of manufacture, refers to the "cooked" charge of the retort having the form of a cylinder which "travels by gravitation to the cooling chamber, where it immediately begins to disintegrate, without any mechanical help, into lumps of the ideal size for domestic consumption." This would imply that all the discharged coke placidly takes a domestic size. For the later revelation that it has the frailties of other coke in forming breeze, we must be grateful, though gratitude will not debar us from suggesting that 5000 tons per annum from 58,000 tons of "Coalite" will prove to be on the low side, whatever new handling improvements are projected.

Bringing up the Reserves.

Mr. Still gives figures of the air pollution prevailing in various large towns, just as though it was "Coalite," and "Coalite" only, that would make things better. He has not a word to

say for the clarification achievements already registered by other suppliers of smokeless fuel, solid and gaseous; that is not his mission. From this point he passes to "unsolicited tributes," and gives the following letter, which should make gas interests sit up and take notice:

City Hall, Manchester,

Nov. 7, 1929.

To the Low Temperature Carbonization, Ltd.

Sir,—In view of the seriousness of the smoke problem in Manchester and the wide industrial and residential area around it, we desire to urge upon your Company the importance of securing larger supplies of "Coalite" for this district.

As a smokeless fuel, which burns in an open grate or in a kitchen range, is a vital necessity if we are to have a cleaner city under a cleaner sky, we would go further and ask you to allocate the whole output of one of your plants to the Manchester area.

Yours faithfully,

Signed by

The Very Rev. Dr. HEWLETT JOHNSON, Dean of Manchester,
The Rt. Rev. F. S. G. WARMAN, Lord Bishop of Manchester,
R. VEITCH CLARK, Medical Officer of Health, Manchester,
Ald. W. T. JACKSON, Chairman, Manchester Public Health Committee,
A. H. COLLINS, Mayor of Salford.
H. OSBORNE, Medical Officer of Health, Salford,
JOHN ROTHWELL, Ex-Mayor of Salford,

and thirteen other public citizens, more or less well known.

We do not know how far these publicists have declared willingness, in sending a letter to Low Temperature Carbonization, Ltd., to take part in the public exploitation of "Coalite," but it would seem to provide food for inquiry. It cannot be questioned that these gentlemen are each and all actuated by worthy motives, but it is a queer twist that puts them upon the same platform with this extraordinary pæan of praise for "Coalite" from Mr. Still. Even publicists who seek the common good can be expected to show regard for all workers in the direction of cleaner air, and not to put all their eggs in the "Coalite" basket. If they have been misled into a false position, a disclaimer would be the appropriate way of rectification. Whatever betide, the gas industry can hardly look on quiescently while things of this sort are proceeding. Memory is too fresh of other opportunities of protest which, let slide, have exacted a retributive price. We do not wish proprietary solid smokeless fuel to have things all its own way with both public and private interests, and the smokeless fuel industry of a century's existence to be swept into the dust bin unmourned and unacknowledged. The gas industry should have something to say about it, and, in view of the mailed publicity given to Mr. Still's peroration, pretty quickly.

GOVERNMENT SUBSIDY.

In a "summing-up," Mr. Still says: "On these grounds alone a wise Government would probably feel themselves justified in paying a subsidy on every ton of smokeless fuel sold, and even then the country as a whole would be deriving considerable benefit from the operation of the process. . . . The industry can stand on its own, but conditions at present are so unfavourable," &c. Yet in the next breath he says: "There seems no reason to doubt that the shareholders will before long have to congratulate themselves upon their foresight in having taken an active interest in this new and immensely important industry." If "foresight" here is interpreted aright, it implies the receipt of satisfactory dividends. To share with that benefit aid drawn from the Government would be as immoral as a polygamous marriage with two rich heiresses.

If truth be told, Mr. Still plays upon too many instruments. To urge the need for smoke abatement, creation of employment in an "oil" industry, improvement in national defence, more secure and profitable employment for a large number of miners, and even medals awarded to "Coalite" by the Royal Sanitary Institute as warrant for investment in this industry, brings too many wind instruments into the orchestra. The only real issue is: "Has 'Coalite' been put on a sound, remunerative, commercial basis?" If Mr. Still is satisfied that it has, why put in further pleadings? Shrewd investors are unlikely to be misled, or those who remember the past history of "Coalite." But all investors are not shrewd, and a lot of "new rich" have sprung up who remember not the millions which have "gone west" in its exploitation. If, after all that has already happened, no authoritative voice can be raised which will at least put everyone on his guard, the fruits of experience are not being adequately applied to the avoidance of future mistakes.

WHERE THE GAS INDUSTRY STANDS.

It is particularly unfortunate that, just when the gas industry (the one tribunal best able to decide) is actually trying out the pros and cons of low-temperature carbonization, appearances should point to a further period of financial indiscretion, with its shaking of confidence in the existing coal carbonizing industries. It has erroneously been held by low-temperature advocates that the gas industry is antagonistic to their ideals, whereas its criticism has been the inevitable and reasonable result of its own wide experience of what can or cannot be done in retorts operated at high or low temperatures. The efforts of any gas undertaking designed to find out the truth of low-temperature carbonization should not be allowed to pass before the gaze of the public in such a form as to give the impression that the process has the industry's approval.

Last September coalowners in South Yorkshire issued by advertisement a proclamation of their individual and collective capacity for serving the public. There was a diagrammatic map of this coalfield, and a full-page was taken in "The Times" and other leading papers. It is worth considering whether the gas industry should not have greater recourse to this form of publicity in establishing its rights in matters of public policy. Offhand there come to mind such questions as Government electrical preference, municipal housing dictatorship, and the anomalous position on gas pricing as subjects upon which the public should be more widely informed. Now we have this "Coalite" exploitation to consider, and while the gas industry can make no pretence of being custodians of public morals, it does seem that it should be ready to resist anything that reflects upon, or interferes with, its own capacity to give the public good service. This is thrown out as one constructive suggestion. It involves expense, but whatever be the additional means invoked in putting the "gas case" adequately, it is apparent that efforts in this direction must be intensified.

Maintenance Scheme Considered at Penrhyn.—The Penrhyn U.D.C. Gas Committee have appointed a Sub-Committee to consider and report upon a scheme of maintenance of gas consumers' fittings, and as to means of co-operating with the plumbing trade of the town.

Sulphate of Ammonia Propaganda in Australia.—A new company, known as the Nitrogen Fertilisers Proprietary, Ltd., has been formed at Melbourne with a capital of about £10,000 to market sulphate of ammonia as a fertilizer. Field officers will be appointed to tour country districts to advise farmers on problems of fertilization. A number of the principal gas companies in New South Wales and South Australia, and Imperial Chemical Industries, Ltd., of Australia and New Zealand, are reported to be among the chief shareholders in the new concern.

South Shields Education Committee Approve "Fairy Gas" Competition.—The South Shields Education Committee have decided to inform the head teachers of schools that they have no objection to scholars entering the "Fairy Gas" competition promoted by the British Commercial Gas Association, on the strict understanding that they do so out of school hours, so that the competition will not in any way interfere with the ordinary curriculum; and the Committee have granted permission to the General Manager of the South Shields Gas Company to forward particulars of the competition to each head teacher of schools in the Borough.

Satisfactory Results at Bingley.—A net profit of £714 on the past year's working of the Bingley Urban District Council gas undertaking was reported to the Council last week. The gross profit was £5308. The total quantity of gas sold was 158,649,300 c.ft—85,502,626 through ordinary meters, 57,116,000 through prepayment meters, and 16,030,674 in public lighting.

National Physical Laboratory Report.—The National Physical Laboratory Report for the year 1929 has been published by H.M. Stationery Office for the Department of Scientific and Industrial Research (price 11s. net). In the course of the report it is stated that experiments are in progress on the ignition of gases by sudden compression, and on the specific heats of gases at high temperatures, the latter in co-operation with the Physics Department. The investigation into the strength of steel chains and hooks, following the work completed on wrought-iron chains, has been proceeding and will continue during the coming year. In the joint research on materials for use at high temperatures, the Metallurgy Department have devoted attention to the group of alloys consisting mainly of nickel, chromium, and iron. The study and constitution of these alloys has not yet been completed, but certain alloys have been found to offer exceptionally high resistance to mechanical deformation at high temperatures in the cast state. The National Physical Laboratory is to be open for inspection, at the invitation of the Board, on Friday, June 27 next, from 3 to 6 p.m.

The Rationalization of the Gas Industry.

By George Evetts, M.Inst.C.E., M.Cons.E.

Before considering the various aspects of this important subject, it would not be out of place to examine the word "rationalization" with a view to obtaining a conception of its meaning. "Rational" is defined in a dictionary as "reasonable" or "logical;" but this does not carry us very far. In its commercial sense it is generally understood to signify an increase of efficiency brought about by the re-organization of finance and management, sometimes accompanied by the amalgamation of two or more undertakings, or by the scrapping of out of date or unnecessary plant and methods. As indicated, the plant or organization so scrapped may not necessarily be inefficient or obsolete; the fact that, by a judicious re-arrangement or merging, it may become redundant should be sufficient to consign it to the scrap heap if its resurrection is not likely to be on the same site. When referring to an organization, by the same process, much money can be saved or greater efficiency may be obtained, or sometimes both, by re-organizing vertically instead of horizontally, by centralizing certain portions of the business and decentralizing others.

General Considerations Applicable to the Gas Industry.

The following factors should be considered in deciding whether an undertaking can be capable of improvement, either within itself or by some form of co-operation with other and stronger organizations.

(1) The statutory position, &c.
(2) The financial position—*i.e.*, the strength of the balance-sheet, the earning capacity, the capacity for raising capital, and other incidental matters.
(3) The geographical or strategical position.
(4) The efficiency and capacity of the works.
(5) The efficiency and capacity of the distribution system.
(6) The efficiency of its organization.
(7) The ability and policy of the directors.
(8) The price of gas and the usual factors which have an influence on the price.
(9) The potentialities for development.

These are not intended to be given in order of importance; that would be too difficult a task, and the result would be highly controversial, to say the least. Further, it can be stated that many of these are inter-connected; thus the ability of the directors may be responsible for the organization, or their policy may be the cause of good or bad work. The statutory powers and restrictions may be the cause (or even the result) of a bad or good financial position. But it will not be challenged that the points referred to are the ones which would claim the immediate attention of those who would attempt to "rationalize," whether from within or without.

Methods of Rationalization.

There are two broad divisions of the various methods by which rationalization may be effected—*i.e.*, from within, and from without.

The methods falling under the first heading may include the modernization of the statutes, reconstruction of works, development of the district, re-organization of the management or directorate.

The necessity for improvement in the matters referred to are generally more pronounced in small undertakings; but the reasons are usually more obvious. The principal reason for lack of efficiency is the paucity of financial resources—not only on account of capital limitations, but the inability to pay for the requisite skilled advice. This last mentioned handicap has improved during the last few years owing to the excellent services rendered by the activities of the public bodies associated with the industry, the National Gas Council, the British Commercial Gas Association, and the Gas Companies' Protection Association. On the technical side, the officers have access to the published work of the Institution of Gas Engineers and similar local associations, coupled with the willingness of the officers of larger undertakings to give their less fortunate confrères the benefit of their experience. The contractors are also willing to give any seeker for information the benefit of their research and experience. At the same time, there are inherent difficulties which the smaller undertakings cannot surmount.

It must also be admitted that there is room for vast improvement in some of the larger undertakings which cannot be said to suffer from lack of financial restrictions. Profligate expenditure, bad service, and lack of enlightened policy are not unknown among undertakings which have the natural advantages which should have produced better results if those advantages had been properly utilized. These troubles which are now being encountered were not apparent when the competition of other forms of light, heat, and power was less severe than it is to-day.

At the same time, however, it must be admitted that to tackle the problems now confronted by the "unfortunates"—whether large or small—may well be beyond the power of drastic improvement from within, and it only remains to consider rationalization from without.

Methods of Rationalization from Without.

This leads to the more usually accepted interpretation of the term. Among the methods which can be employed are the following:

(i.) By the formation of holding companies.
(ii.) By working agreements in which neighbouring companies obtain a measure of control.
(iii.) By amalgamation, or purchase outright.
(iv.) By purchase of gas in bulk from neighbouring gas companies or coke ovens.
(v.) By purchase of gas from a gas grid. The gas may be supplied by (*a*) a central gas-works; (*b*) a coke oven; (*c*) a low-temperature or central carbonizing plant at a colliery; or (*d*) a composite grid of suppliers carbonizing by any of the methods under (*a*), (*b*), or (*c*). The gas grid may be local in character or regional.
(vi.) By combination with electric undertakings.
(vii.) By gas companies taking an interest in collieries, or by pooling arrangements for purchase of coal and other materials, or the treatment and sale of residual products in a pooling scheme.

These methods will be further examined later.

Methods of Improvement whether Internally or Externally.

There are many ways by which the industry can assist in rationalizing itself, independently of the methods referred to.

The Gas Undertakings Acts of 1920 and 1929 have already rendered great service to the industry in removing restrictions, which enables the manufacture of gas under modern conditions; these Acts confer freedom to take advantage of improvements in carbonization and enable undertakings to turn to good account the trend of market prices in coal and residual products. The acquisition of statutory powers is now less expensive than in former years, and there is a slight improvement in financial matters.

The National Gas Council, as the official representative of the industry, is now endeavouring to obtain such new powers as will remove many of the financial restrictions now in force, and are concentrating on the question of freedom in tariffs. There is little doubt that a re-organization of tariffs would enable many undertakings to increase the sale of gas to such an extent that eventually the price, even to the small consumers, can be reduced.

The experiments which have already been made in Halifax and elsewhere have convinced the responsible officers of the undertakings in question that there is an immense field for development in the sale of industrial as well as domestic gas. It is not the writer's intention to go further into the matter of tariff construction; but a graduated discount scale with a demand charge interwoven can meet many of the requirements of large consumers and operate very nearly in the same manner as a two, three, or four part tariff.

In some Continental gas grids, discounts as much as 60 p.ct. are being offered from the flat-rate for small consumers, and in the natural gas fields in Rumania, after the block dealing with purely domestic consumption, the discount is as high as 53 p.ct. from the first or flat-rate block for small consumers. Incidentally, the lowest rate block in the scale works out at the equivalent of $\frac{5}{8}$d. per therm.

(*To be continued.*)

Tenders for Hampton Court Stock Issue.—The tenders for the £40,000 5 p.ct. redeemable debenture stock which were offered by Messrs. A. & W. Richards, of 37, Walbrook, E.C., on behalf of the Directors of the Hampton Court Gas Company, were opened on May 21. They ranged from £100 down to the minimum of £95 p.ct., the average price obtained being £95 3s. 2d. p.ct.

Corrigendum.—In our account of the annual dinner of the Society of British Gas Industries in last week's "Journal," Mr. C. S. Shapley was reported to have said: "In a further reference to the necessity for dealing in gas in terms of heat units, the Leeds gas undertaking was producing 1,490,000 units, whereas the electricity undertaking in the city produced only 462,000 units." The figures should read 1,490,000 million B.Th.U. and 460,000 million B.Th.U. respectively.

INSTITUTION OF GAS ENGINEERS.

Annual Meeting in Leeds, June 2—6.

A record attendance is certain; the papers to be presented deal with problems which are exercising the minds of all gas engineers; and the arrangements for the visits to works and to places of historic and artistic interest are unusually attractive. The following pages of this issue of the "JOURNAL" constitute a complete, profusely illustrated, guide to the visits which form part of the proceedings. In turn the following works and places of interest are described and pictured:

Wharfedale, Temple Newsam and Wentworth Woodhouse, the Fuel Department of the University of Leeds, the new distribution workshops of the Leeds Gas Department, the Meadow Lane and the New Wortley Gas-Works, the Dewsbury Road Station, the works of Clayton, Son, & Co., Ltd., the Klönne holder in course of erection at York, and the works of Wilsons & Mathiesons, Ltd.

Armorial Bearings of the Institution.

"By Diligent Investigation We Serve."

The College of Arms has made a grant of Armorial Bearings to the Institution of Gas Engineers. The design and motto ("By diligent investigation we serve") were prepared by Somerset Herald and the Secretary of the Institution (Mr. J. R. W. Alexander), and admirably represent the various activities of the Institution and the attributes of the Gas Industry. The Armorial Bearings are thus unofficially described by Mr. Alexander:

Arms.—The shield is divided horizontally into black and red, conveying to the mind coal and heat respectively. Over this is a white "fess rayonee," to symbolize light. Over all is a gold "bend," and thereon a retort between two books, in natural colourings, to call attention to the education and research work of the Institution. In the base is a gold heraldic "mount," indicating the valuable residuals which result from the manufacture of gas.

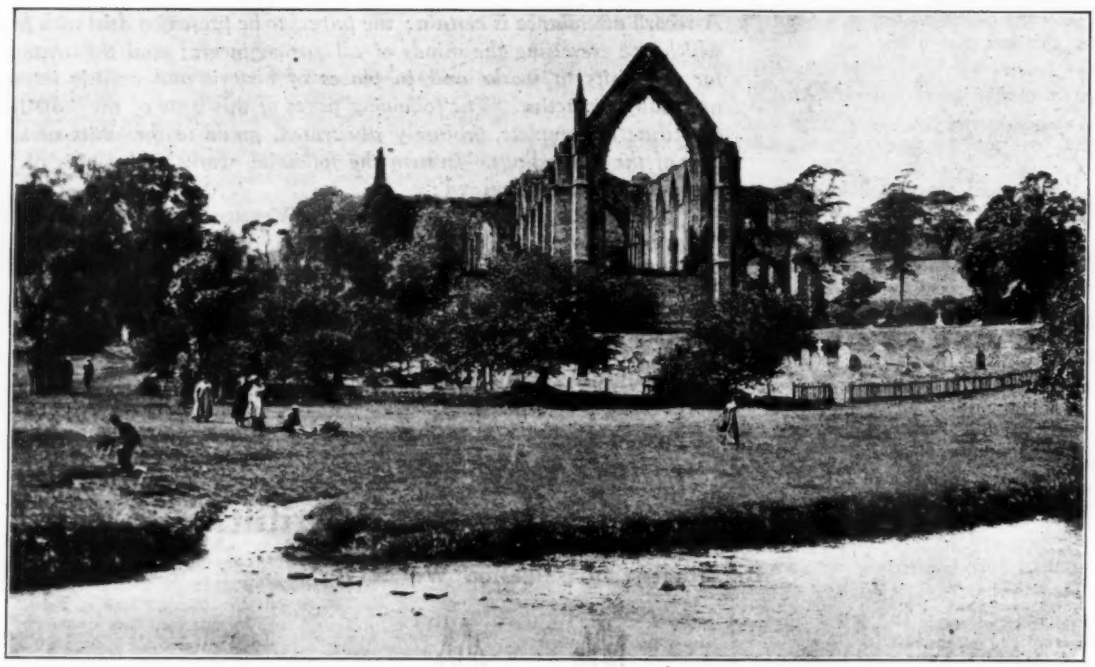
Crest.—Issuing out of a gold crown "rayonee" are two gold torches with flames in natural colours.

Supporters.—On the left side there is a gold lion rampant with red tongue and claws and with a red crown (as in the Crest) round his neck, and charged on the shoulder with a red roundle. The lion, reminding one of the Lion of England, may be taken to refer to the Royal Charter of the Institution. On the right there is a black bull rampant with gold horns and collared as the other Supporter, but with a gold crown, and the roundle on his shoulder is gold. The bull denotes strength and, like the lion, conveys the idea of power.

Motto.—Assidue exquirendo servire: "By diligent investigation we serve."

A Tour through Wharfedale.

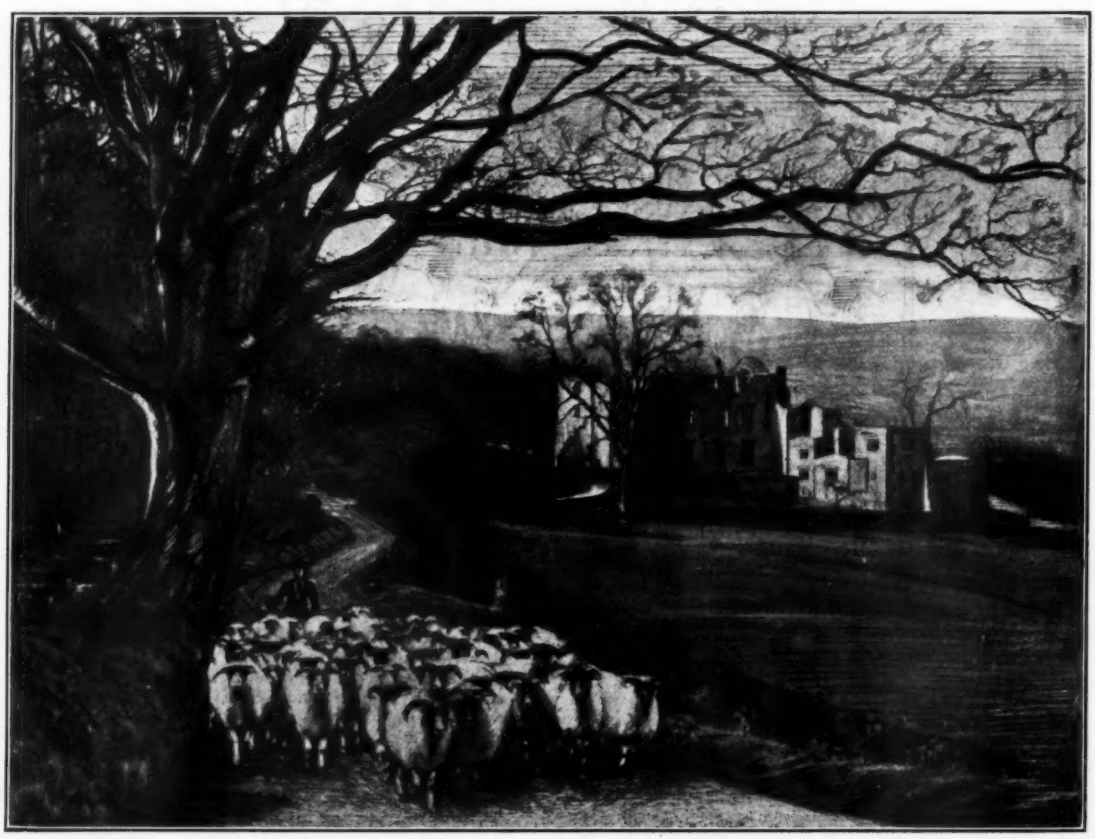
A short tour has been arranged for Friday of Institution Week to enable visitors to see in the limited time available as much as possible of the most interesting part of Wharfedale—the finest of the Yorkshire Dales.



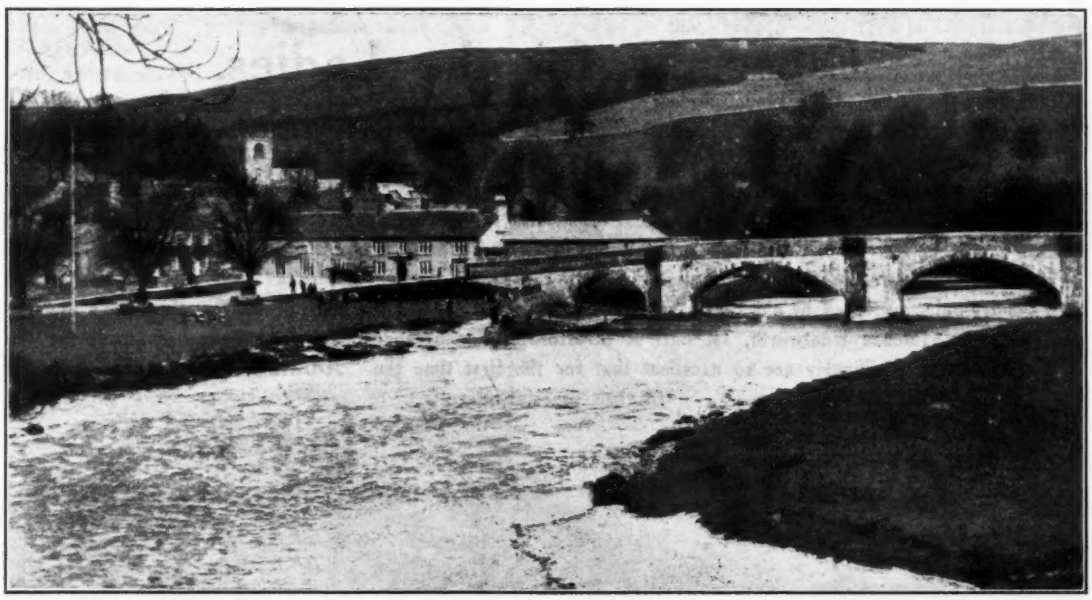
BOLTON ABBEY—ONE OF THE MOST CHARMING PLACES OF INTEREST IN WHARFEDALE.

The whole of the route selected consists of good-surfaced roads (for Yorkshire, at least), and avoids dangerous hills and roads unsuitable for a number of large cars. In places even the main roads are narrow and twisting, but little traffic should be encountered, except perhaps in the small town of Otley, where it will be market day.

The run will include views of Lower Wharfedale from the slopes of The Chevin, and, from the summit of Norwood Edge,



BARDEN TOWERS—A PICTURESQUE RUIN ON THE DUKE OF DEVONSHIRE'S ESTATE, PASSED *EN ROUTE* TO BURNSALL.

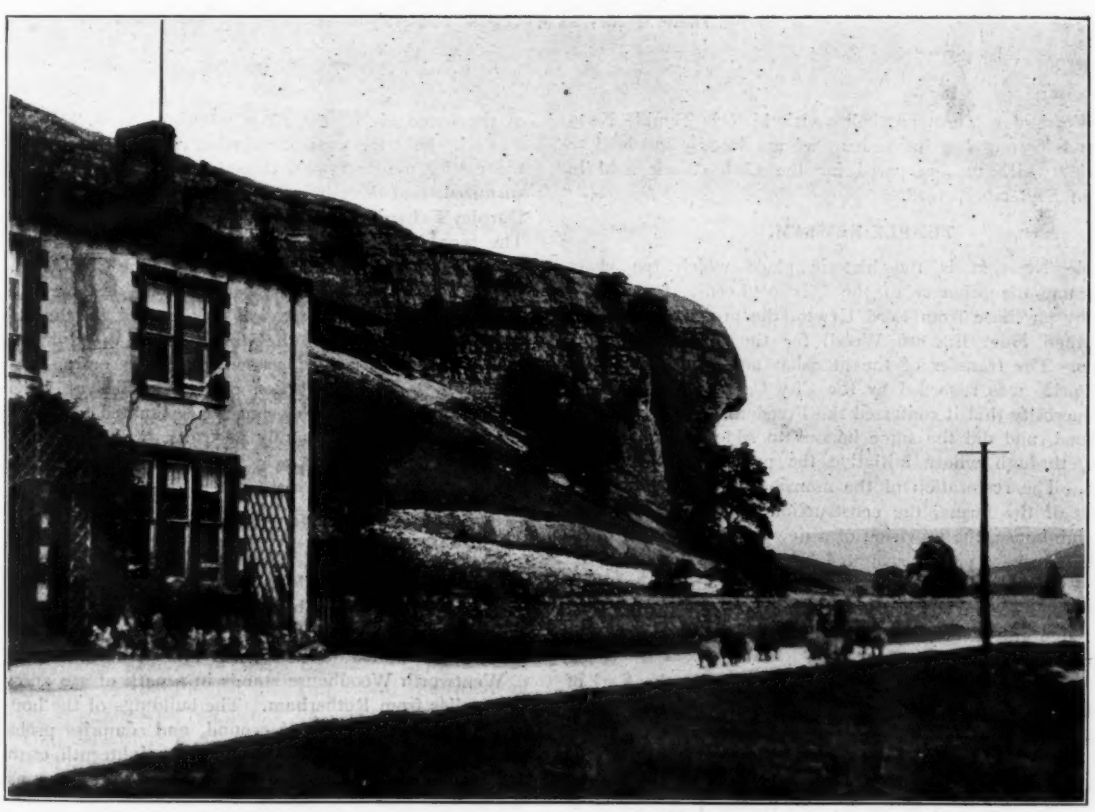


BURNSALL—OFTEN SAID TO BE THE PRETTIEST VILLAGE IN YORKSHIRE. THE PARTY WILL GO OVER THIS BRIDGE.

an extensive panorama of the Leeds Corporation reservoirs, which have surely made rather than marred the beauties of the Washburn Valley.

After a detour eastwards for lunch at Harrogate, a return will be made through the quaint hamlet of Blubberhouses to the very heart of Wharfedale—the famous Bolton Abbey and Hall (a residence of the Duke of Devonshire). After passing the beautiful monument to Lord Frederick Cavendish, wilder country is entered, and Barden Towers (12th century) are passed before reaching Burnsall, claimed to be one of Yorkshire's prettiest villages.

Lack of time necessitates leaving the Wharfe at Kilnsey and returning by way of the high moorland between Wharfedale and Upper Nidderdale. Near the tiny village of Greenhow, once a busy centre of lead-mining, the road reaches an altitude of 1400 ft. above sea-level, before a steady undulating descent of five miles brings one to Stonehouse, and so back by Lindley Moor and Farnley Park to Leeds or Harrogate.

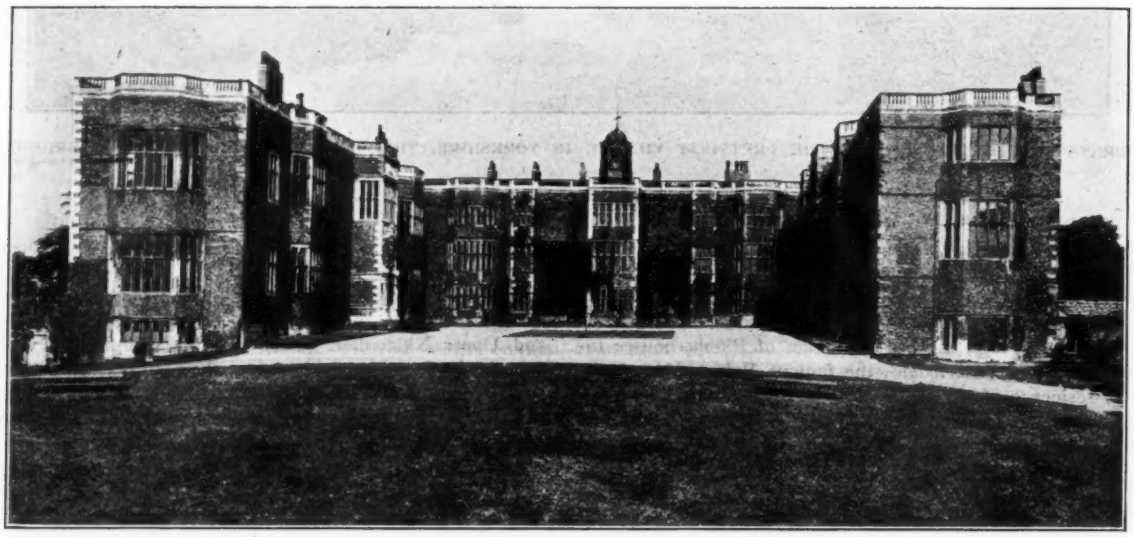


KILNSEY CRAG, WHARFEDALE—AN IMMENSE OVERHANGING ROCK ON THE ROADSIDE.

Especially for the Ladies.

Two Famous Country Palaces: Temple Newsam and Wentworth Woodhouse.

On Wednesday and Thursday of next week ladies attending the Institution Meeting will have the opportunity of visiting two very beautiful buildings redolent of historic pagentry. One, Temple Newsam, one of the stately homes of England, which has dispersed hospitality to kings and princes, is now the property of the City of Leeds. The other, Wentworth Woodhouse, which belongs to the Fitzwilliam Family, ranks as perhaps the largest of the country palaces created by our 18th century Whig magnates. It was the home of Charles the First's ill-fated administrator, Thomas Wentworth, 1st Earl of Strafford. The arrangements which have been made for the ladies by Mr. C. S. Shapley are so excellent that for the first time the "JOURNAL" devotes these columns to their especial interests.



TEMPLE NEWSAM, CLOCK COURT.

On Wednesday afternoon, ladies visit historic Temple Newsam; and for our description here we are largely indebted to a booklet which was prepared for the Civic Week held in Leeds in September, 1928.

TEMPLE NEWSAM.

Temple Newsam is the historic place which ten years ago became the property of the City of Leeds. It was acquired by purchase from Lord Urwin, the present Viceroy of India (then Hon. Edward Wood) for the nominal sum of £35,000. The transfer of the mansion and its 917 acres at such a price was regarded by the City Council as an act of such generosity that it conferred the Freedom of the City upon Mr. Wood, and did the same honour to Alderman Sir Chas. Wilson, through whose initiative the purchase mainly was effected. The restoration of the mansion, the equipping and stocking of the farms, the construction of two golf courses and a club house, the provision of a new park road, &c., have, with the purchase price, accounted for a capital outlay on the property of £110,000, but no one who appreciates the value of Temple Newsam as a show-place and pleasure ground will grudge the cost. It has come to be regarded as the "Hampton Court of the North."

In the year 1545 was born at Temple Newsam the Earl of Lennox's son, Lord Darnley, who became the husband of Mary Queen of Scots and the father of King James I. In 1622, the manor passed by purchase from the Lennox family to Sir Arthur Ingram, described as a wealthy London citizen and by Thoresby as a native of Rothwell. Sir Arthur Ingram was in the favour of James I. and acquired his wealth through a grant of the monopoly of the alum workings near Redcar. He it was who built the present mansion (about 1630) on the site of the earlier manor house, though it is probable, as Thoresby surmized, that the portion of the house which included "Lord Darnley's chamber" was incorporated in the present building. The second son of Sir Arthur Ingram was created Viscount Irwin by Charles II. for services during the Civil War. There was a succession of nine Viscounts Irwin, but the title lapsed and eventually the estate was bequeathed by the late Hon. Mrs. Meynell-Ingram to the Hon. Edward Wood on whom the title of Baron Irwin was bestowed on his becoming the Viceroy of India. The connection of the families of Lennox and Ingram with Temple Newsam is perpetuated to the benefit of Leeds by the gifts of family portraits, "old masters," tapestries, and old furniture, which lend to the mansion a unique historic and artistic interest.

WENTWORTH WOODHOUSE.

In "Country Life" there appeared a few years ago a beautifully illustrated description of this magnificent home; and our notes here are based upon that description. The visit will take place next Thursday afternoon, when the ladies will be entertained at tea by Earl Fitzwilliam.

Wentworth Woodhouse stands in a park of 250 acres, about four miles from Rotherham. The buildings of the house itself cover some three acres of ground, and comprise probably the largest of the country palaces of the eighteenth century. It was the home of Charles I.'s administrator, Thomas Wentworth, first Earl of Strafford.

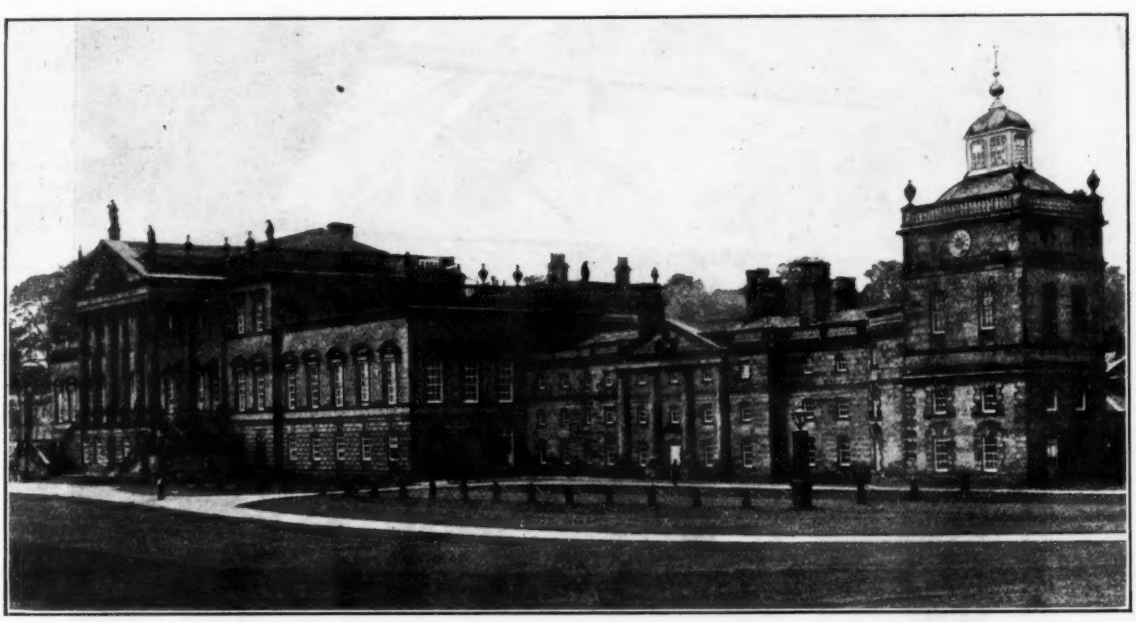
There is now nothing to show what the original Woodhouse

may have been, but it was probably what the name implies—an edifice of timber. The double square court, with the porter's lodge in the outer wall, was a favourite plan of houses built during the reign of Henry VIII. and early part of Elizabeth's. The house in the time of the great Lord Strafford was of the full classic design first introduced into England by Inigo Jones after his return from Italy in 1615, and all that remains of this part can be seen from the Chapel on the South Court. The buildings were added to by the first Marquess of Rockingham about 1725, who changed the name to Wentworth House; but the old name came into use again about the time of the fourth Earl Fitzwilliam.

The central block of the West or Garden Front has a length of some 130 ft., and is set against what remains of the seventeenth century house that stretches beyond it to the south. Over the windows of the south end of the wing may be seen the Wentworth crest and letters "T.W." in cipher. These initials may stand for either the first or second of the Watson owners, but the assumption that this West or Garden Front was added by the Marquess of Rockingham and not his father is further strengthened by the heraldic devices which commemorate the honour of a Knighthood of the Bath conferred on the second Thomas Watson Wentworth in 1725, while the absence of any coronet, such as is found elsewhere, fixes it as before 1728, when he was created Baron Malton.

Ascending the main staircase from the Pillared Hall one comes to the Saloon above. This is a truly vast hall, 60 ft. square and 40 ft. high, with a gallery 10 ft. wide running round the whole. The chimney-piece is the work of John Gibson, probably about 1821; all else in the hall is in Flitcroft's early Georgian manner. Passing out by the north-easterly door, one finds oneself in the Statuary Room, where there are some fine examples of the work of Chantry, Wyatt, and Nollekens. Proceeding through this room one comes to the State Dining-room—originally the Grand Drawing-room. Particular notice should be taken here of the exceedinly fine mahogany side-tables such as Adam designed and Chippendale executed. The walls and ceiling are richly decorated with stucco. In this room are portraits of the various members of the Watson Wentworth family who were responsible for the building of the present house. Over the chimney-piece is Van Dyck's picture of the lady who brought Wentworth to the Watsons, and of her brother and younger sister. They were the three children of the great Lord Strafford.

From this room one passes by the north-east door into the libraries, which were originally the state bedroom and dressing room respectively. In the larger of the two rooms there is a very fine covered ceiling in stucco. Out of what is now known as the Little Library, but which was originally the Ante Room, opens the Long Gallery, 130 ft. in length. The



WENTWORTH WOODHOUSE.

On the rising ground to the south of the house is an immense terrace, behind a massive retaining wall 1500 ft. long.

On entering the house by the ground-floor door below the Portico, one comes into the Pillared Hall, with its rows of Doric columns supporting the floor of the saloon above. access to which is through the archway at the end opposite the entrance door and up the stairs. In a tour of the house one is particularly struck by the numerous and beautiful mirrors on the walls of the various rooms. Besides some fine Queen Anne mirrors will be found some beautiful examples of Chippendale's work, notably in the boudoir in Clifford's Lodgings and in the Green and Striped Bedrooms. There are unique examples of Chippendale's furniture and some typical pieces in his Chinese manner will be found in the Chapel Gallery. To the left of the Pillared Hall is a fine suite of rooms, the first entered being now known as the Ship Room—from the various pictures of ships contained therein. One then passes on to the Painted Drawing-room, the walls of which are covered with paintings on canvas stretched on frames and depicting Watteau-like subjects of "The Five Senses." Passing through the little ante-chamber one finds oneself in what is known as the Low Drawing-room. In here the carved woodwork and the corner niches are very fine, while there is also a typical mirror attributed to William Kent.

pictures in this gallery are mainly of the Italian School, and by such artists as Palma Vecchio, Guido Reni, Guercino, Annibal Caracci, and Salvator Rosa.

Some other interesting rooms which should not be missed are the Yellow Rooms, the Old Hall, the Chapel, and the Van Dyck's Room. In the last-named the chimney-piece is considered to be the best designed and most exquisitely wrought of the series of marble in the house.

About a mile from Wentworth Woodhouse is the old Church or Chapel of Wentworth, which is of extreme interest. The earliest mention of this is in the endowment of the vicarage of Wrath, in 1235. Of the main fabric, with the exception of the tower, little is left, but from the appearance of the semi-circular arch and cylindrical columns between the nave and the chancel, it must have been founded at least a century before 1235. Here the successive chiefs of the house of Wentworth found interment.

GOLF COURSES AVAILABLE.

The following golf courses will be available to ladies:

Moortown Golf Club: On the route of Harrogate 'buses, or tramcar to Moortown.

Sandmoor Golf Club: Adjoins Moortown.

Alwoodley Golf Club: On the route of Harrogate 'buses.

Headingley Golf Club: Near route of Otley 'buses.

Official Visits of the Institution.

Visits have been arranged to the new Workshops of the Leeds Gas Department and to the Fuel Department of the University of Leeds. Both will take place next Wednesday afternoon.

New Distribution and Street Lighting Workshops of the Leeds Gas Department.

The extensive new buildings of the Distribution and Street Lighting Sections of the Leeds Corporation Gas Department were officially declared open on Jan. 6 by the Lord Mayor of Leeds (Councillor N. G. Morrison).

The new workshops take the place of the former workshops in Swinegate, and co-ordinate phases of work formerly carried on under separate roofs at Sovereign Street, Springwell Street, and the Meadow Lane Gas-Works. The Leeds Gas Department lights over 600 miles of roads every night. Statistics for the year 1928 show that there were in that year 18,254 street gas lamps. More than 17,000 of these are already working under automatic clock control, and the remainder will be brought under the system as convenient. In the same year there were 72,318 automatic meters and 61,828 ordinary meters. The revenue of the Leeds Gas Department for the working year ended March 31, 1929, was over £750,000.

AN INTERIOR VIEW OF THE NEW WORKSHOPS AT LEEDS.

Re-Conditioning of Cookers.

The main general store is a very large building, along the corridor through which, the whole length of the building, runs a conveyor platform, let into the floor, travelling at the rate of 40 ft. per minute, and collecting or depositing goods at any point desired. The conveyor begins at the extensive loading docks at the far end of the building, where wagons bring in meters, cookers, fires, &c., for testing, repair, and renovation, or for dismantling. The visitors will be able to see cookers in rusty and grease-covered condition, and other appliances, passing through the processes of washing, bathing in caustic soda, re-conditioning in every way, and eventually repainting or plating, and turning out as second-hand articles looking and working almost as if new. The big general store, the cooker and fire renovation shop, and the meter shop, are all very roomy, with a foreman's office in the centre of each shop, giving him a complete view of the whole area under his charge. The foreman in each case also has control, by switches, of the excellent steam heating system and electric fans and ventilation system for removal of gas fumes through roof outlets.

Meter Testing.

The visitors will be shown the testing and repair of street lighting control clocks, meters, &c., including dark rooms for gas-testing of meter-cases for pin-hole leaks, and for finding pin-holes in meter diaphragm leathers. The magistrates' testing room will also be inspected. In the meter shop all the sheet metal work for the whole department is done.

The new workshops are equipped with their own automatic relay telephone installation. The receiving dock on the Regent Street frontage of the building accommodates twelve wagons at a time, and the despatch dock on the Gower Street side ten wagons. In the general offices the visitors will be able to inspect the card index system by which the history of every gas appliance is on record, from the issue by the maker, through its use by the consumer, its return for repair, testing, or renovation, up to its final dismantling.

The buildings themselves are on the most up-to-date lines. They have a concrete base and comprise a steel frame filled with pressed bricks. The roofs are very generously glazed to give plentiful natural lighting, and ventilation is by means of large Robertson ventilators in the roof. The workshop floors are hardened to prevent dust and wear, and the office floors are of wood blocks. Artificial lighting throughout is by low-pressure incandescent gas.

Department of Coal Gas & Fuel Industries (with Metallurgy).

The University of Leeds.

By H. J. HODSMAN, M.B.E., M.Sc., F.I.C.

One of the first subjects to be taught in the Yorkshire College, which in 1904 became the University of Leeds, was coal mining. Prof. G. R. Thompson, Head of the Mining Department when the University received its Charter, desired that the study of fuel and metallurgy should be added to the teaching of mining. In this, he was supported by Prof. Smithells, Head of the Chemistry Department, whose investigations of the properties of flames had brought him into contact with the gas industry, the leaders of which at that time were desirous of furthering the scientific development of their industry.

As a result, the University authorities were persuaded in 1906 to embark on the project of establishing a separate Department for teaching and research in Fuel and Metallurgy, with Prof. Bone at the head. This was a courageous act of faith, for there was no precedent in this country, and financial resources available were lamentably inadequate. Some encouragement could be drawn from the success and established reputation of such a school in Karlsruhe in Germany, under the direction of Prof. H. Bunte. Moreover, recognition is due to the support given by such prominent gas engineers of those days as Sir George Livesey and Sir Corbet Woodall.

The problem of housing the Department was solved by the West Yorkshire Coal Owners' Association, who provided funds for a building to be shared by the Mining Department and the new Fuel Department. This building was erected in 1908 costing about £8000, and the equipment of the new Department of Fuel and Metallurgy was assisted by a donation of £1000, made by Messrs. G. Bray & Co., Ltd., of Leeds.

The Institution of Gas Engineers ensured the continuous prosecution of scientific investigation by establishing the Gas Research Fellowship, which has been held successively by twelve Fellows. Their efforts have produced scientific results of value, but no less important is the fact that their training has enabled them to pass into the industry, whether it be the manufacture of gas or of appliances, where they now hold important and responsible technical posts.

In 1909 was set up the Joint Research Committee of the Institution and the University for the investigation of "Gas Heating" problems. Except for a break during the war, this Joint Committee has continued to work ever since, but with description, personnel, and subjects varying from time to time. The work initiated by this Committee has covered a wide range of problems of manufacture and utilization, much being directed to answer questions of immediate importance to the industry. The value of the work is evident, and many of the results have been translated into standard practice.

In establishing the Research Fellowship and the Joint Research Committee, the Institution thus set on foot a scheme of co-operative research which long ante-dated the system which came into vogue after the war, with the establishment of Research Associations for the industries.

In 1910 Sir George Livesey died, and a fund of over £10,000 was raised to perpetuate the memory of his long and distinguished services to the gas industry. It was decided that this fund might fitly be allocated to endow the Chair of this Department, in the launching of which Sir George himself had been so interested and active. The Chair thus became known as the Livesey Professorship, and the Livesey Advisory Committee—containing representatives of the Institution, of the Society of British Gas Industries, and of the University—was constituted to assist in carrying on the Department.

In 1912, Prof. Cobb was appointed Livesey Professor following Prof. Bone's departure to London. At the same time, Mr. H. J. Hodsman was appointed Assistant Lecturer.

The war hindered the normal development of the Department, but useful service was rendered to the Ministry of Munitions in connection with the production of benzole, tar, the inspection of high explosives, and the design and working of glass furnaces.

In 1915 Sir Corbet Woodall, who had actively supported the establishment of the Department, endowed the scholarship bearing his name, which provides a sum of £60 per annum to enable students to study Gas Engineering in the Department. It has already been held by three scholars.

On the death of Sir Corbet, Mr. Henry Woodall, with other members of his family and friends, offered to provide an experimental gas plant for the use of the Department. This was erected only after the war, and was enlarged in scope by the generous assistance of various firms who provided plant. Already the plant has proved of service in systematic studies of the carbonization process.

After the Armistice, there was an influx of students into the Department which severely taxed its resources and accommodation. The scope of the teaching was increased by the addition to the staff of an Assistant Lecturer for Metallurgy (Mr. P. F. Summers), and a Research Assistant for Refractory Materials.

In 1922 the National Benzole Association, which had been established on the decontrol of benzole production after the war, for the purpose of organizing the supply and marketing of benzole, also decided to initiate a system of co-operative research. The example of the Institution of Gas Engineers was followed by setting up a Joint Research Committee of the University with the industry, which initiated and controlled a series of investigations carried out in the Department. The success of this work has encouraged the National Benzole Association to set up its own research laboratory in London.

At the time (1930) a considerable extension of accommodation has resulted from the completion of the first step in the new scheme of University Buildings. In 1925, the University launched an appeal for funds to provide new buildings necessitated by the increase in the number of students and research workers, and the West Yorkshire Coal Owners contributed £25,000 to the fund. This was supplemented by £10,000 from the Miners' Welfare Fund, and enabled the University to proceed at once with the erection of a new building for the Mining Department at a cost of about £40,000.

The space in the old building previously occupied by the Mining Department was placed at the disposal of the Fuel Department in 1929. The opportunity was taken to rearrange and recondition the whole building at a cost of over £8000, to bring it into harmony with modern requirements. This was facilitated by the generosity of some members of the Gas Industry, through their contributions to the University Appeal Fund.

Recently a valuable scholarship of £170 per annum, established to perpetuate the memory of William Cartwright Holmes, has been endowed by Mr. P. F. Holmes and Mr. D. M. Henshaw. This generous benefaction should open a University education to talent wherever it may be found.

In its present form the Department consists of a three-storey brick building, with two one-storey annexes at each side.

On the top floor stands the lecture room, a room serving as museum, with accommodation for reading and drawing, and two research laboratories, with office.

On the middle floor there are two large students' laboratories, one for chemical and the other for physical work. There are also private rooms and offices for the staff, and a private laboratory.

On the ground floor there is a large laboratory for the Gas Research staff, a laboratory for metallographic work, a dark room for microscopy and photometry, office accommodation, stores, and a workshop. In one annexe, where furnaces and grinding machines are installed, it is intended that rougher and less cleanly operations shall be carried out. Special attention has been paid to the ventilation of this room. It is proposed to reserve the other annexe for cleaner operations, and already apparatus for instruction in the laws of flow of gases and heat transmission is there installed.

At the back of the Department stands the Ventilation Building, erected in 1913 by the Joint Research Committee for the study of ventilation by gas appliances. Three reports were issued in the Transactions of the Institution 1914, 1915, 1916, on work done in this building. It is also used by students for tests of gas fires and similar work.

In the reconstruction of the Department, all the services have been renewed or reconditioned. An ample service of gas is laid throughout the building, and also compressed air up to 60 lbs. pressure, so that both low-temperature heating and high-temperature furnaces can be operated. Water is available throughout, both at mains pressure and also at constant low pressure from a tank in the roof. A new electrical installation provides 2 phase A.C. throughout the laboratories by standard double plugs (15 amp. and 5 amp.). A motor generator set supplies D.C. to each floor. For small direct currents at low voltages, small rectifiers such as are used for wireless purposes are employed wherever possible, being operated from the 200 v. A.C. plugs. This obviates the necessity of wiring the building for low voltage D.C. For high temperature electric furnaces, a transformer and switch gear is provided to furnish up to 250 amp. of single-phase A.C. The building has been fitted with a new hot water installation operated by coke boilers.

The internal fittings have been largely remodelled. The floors have been made watertight by asphalt. Where new benches have been installed, these are in small units, the erection of heavy fixtures being avoided. Thus all services are readily accessible by the moving of the units. Services are

carried by a narrow shelf fixed to the wall behind, and quite independent of the benches, an arrangement permitting of great flexibility in the lay-out of the laboratories.

The Experimental Gas Plant, already mentioned, erected in memory of the late Sir Corbet Woodall, and opened in 1924, adjoins the main building. In November, 1917, the University Council gratefully accepted the offer of Mr. Henry Woodall to provide and erect an experimental coal gas plant at the University in memory of his father, Sir Corbet Woodall, D.Sc. The whole plant has been specially arranged for experimental work, and is not simply an ordinary gas plant on a reduced scale. It has been erected to the designs of Mr. J. F. Scott, Assoc.M.Inst.C.E., of London.

Messrs. Woodall Duckham & Co., Ltd., made themselves responsible for the special vertical retort installation, with independent sectional heating, which has been designed to allow of experimental work at high temperatures. Messrs. Gibbons & Co. undertook the horizontal retort work, Messrs. Bryan Donkin & Co., Ltd., the exhauster and blower, Messrs. Clayton Son, & Co., Ltd., Leeds, the condensing and purifying plant and the two gasholders, each of 1000 c.ft. capacity, and Messrs. Parkinson & W. B. Cowan, Ltd., provided the meter.

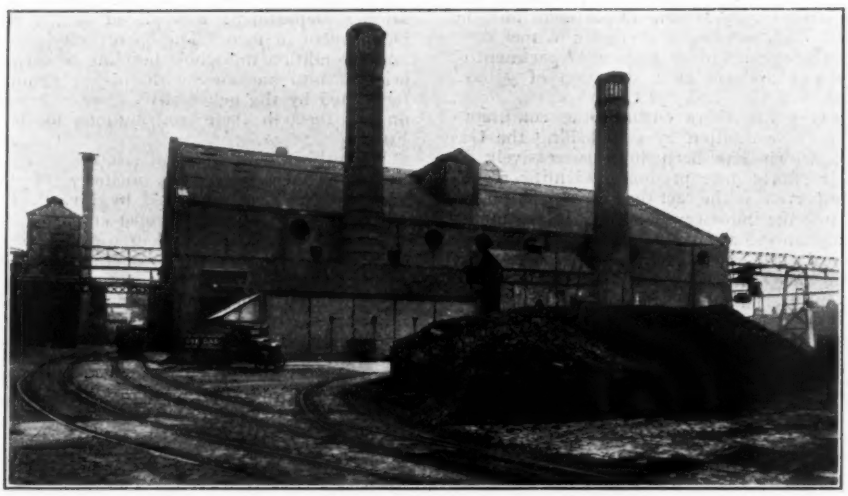
Other generous donations were placed at the disposal of Mr. Henry Woodall for this memorial by Mr. A. G. Glasgow, by the Gas Light and Coke Company, Messrs. Clayton Son, & Co., Ltd., the Tottenham District Light Heat and Power Company, the British Gas Light Company, the Croydon Gas Company, and the Bournemouth Gas and Water Company.

Since its erection the plant has been used for the purpose of a systematic study of the carbonization of coals at varying temperatures, for which purpose it was modified by Dr. A. Parker, when Research Chemist to the Joint Research Committee. These modificatons have been set out in detail in the relevant reports to the Institution of Gas Engineers (Trans., 1925, 1926, 1927, 1928, 1929) giving the results of the investigations. In the recent alterations a one-storey building has been added, to serve as a store for fuel, &c., with a flat roof on which outdoor experimental work may be carried out.

Works of the Leeds Gas Department.

Throughout the Institution Conference next week the works of the Leeds Gas Department, of which the President, Mr. C. S. Shapley, is General Manager, will be open for inspection by the members. We give here an illustrated description of the works.

Meadow Lane Works.



MEADOW LANE GAS-WORKS—GENERAL VIEW.

The area of these works is approximately 14 acres. The Gas Department have sidings in the Hunslet Lane Goods Station of the London, Midland, and Scottish Railway, which will accommodate 80 wagons. In addition, there is room in the works sidings for 100 wagons. The shunting from the Goods Station to the works is done by Gas Department locomotives. The length of the permanent way in the works is approximately 1570 yards, and this was re-designed and renewed in 1922, thereby reducing shunting to a minimum.

Coal Store.—This was formerly an inclined retort house, which was built in 1898. The settings were demolished in 1923, the coal breaking, handling, and conveying plant being left intact, and the house was adapted for the storage of 9000 tons of coal. The house is 190 ft. long, 100 ft. wide, and 43 ft. high from yard level to eaves. The system of removal from stock is by means of telpherage and grabs. This house provides covered accommodation, besides a cheap and expeditious method of putting coal into stock or taking from stock.

The coal breaking, conveying, and elevating plant consists of two hydraulic wagon tippers, one receiving hopper, two tray conveyors (driven by 20-H.P. electric motor), two elevators, two cross conveyors and four bunker conveyors (driven by 80-H.P. steam engine).

Carbonizing Plant.

Dessau Vertical Retort House.—This house is 100 ft. long, 92 ft. wide, and 48 ft. high from yard level to eaves, and contains five beds of Dessau retorts, each comprising eighteen 4-metre retorts with a capacity of 1 million c.ft. per day, together with the usual auxiliary coal and coke handling plant.

The coal handling plant consists of hydraulic wagon tippers, coal breaker, coal elevator and cross conveyor, and two push-plate conveyors.

The coke handling plant consists of De Brouwer hot coke conveyors, bar screens, and telpherage.

Continuous Vertical Retort House.

This house is a steel-framed building with 4½-in. brick panelling, and contains the following plant:

Glover-West Retort Bench.—Nine settings of 8's = 72 33-in. by 10-in. retorts; nominal capacity, 2½ million c.ft. per day; actual capacity, 3 million c.ft. per day; coal carbonized, 180 tons per day; coal bunkers, 48 hours' capacity.

Nine small vertical boilers deal with the waste gases from the nine settings, and have a total evaporation of 3000 to 3500 lbs. per hour.

Glover-West Retort Bench.—Five settings of 6's = 30 50-in. by 10-in. retorts; nominal capacity, 3 million c.ft. per day; coal carbonized, 165 tons per day.

A horizontal multitubular boiler, by Spencer-Bonecourt, deals with all the waste gases from the 50-in. settings; evaporation, 8700 lbs. per hour; the boiler is equipped with an electrically driven induced draught fan.

Dempster Retort Bench.—Four settings of 4's = 16 5-ton retorts; capacity, 1 million c.ft. per day.

The coal breaking, elevating, and conveying plant is duplicated, has unique change-over facilities, and consists of two wagon tippers, one receiving hopper, two reciprocating feed regulators, two rough coal elevators, two screens, two by-pass chutes to coal bunkers, two 4-roll crushers, two broken coal elevators, and two cross push-plate conveyors.

The coke handling plant and storage bunkers were erected to deal with the coke from both benches of continuous vertical

retorts. Each system of verticals is circumscribed by its own gravity-bucket conveyor, the top strand delivering coal to the bunkers and the bottom strand taking coke from the retort house to the screens. Screening is effected by rotary screens, and the plant is duplicated and provided with change-over facilities so that the coke from either vertical plant can pass through either set of screens. The large coke over 1¾ in. is first taken out in the short screen; the long screen afterwards deals with the small coke, breeze, &c.

The telpher plant is of the mono-rail type, and the three machines are by Messrs. Strachan & Henshaw, of Bristol. Each machine is equipped with a 5-H.P. travelling motor, and a 12-H.P. hoisting motor. The plant is so arranged that any grade of coke can be taken from the storage bunkers and deposited by the telpher at any point in the coke yard. This plant also deals with the coke from the Dessau retort house. The length of telpher track is 530 yards, and the height is 33 ft.

The coke storage bunkers are constructed of 4½-in. reinforced brick, and have sufficient capacity to take 48 hours' make of coke. The bunkers are designed to load any grade of coke into railway wagons, motor transport, or carts. The whole of the above plant is electrically driven.

Condensing Plant.—This consits of three distinct units:

1. Two cooling towers, each 15 ft. diameter by 60 ft. high. These were formerly tower scrubbers, and have been adapted as condensers.
2. Six sets of air-cooled condensers, arranged in two batteries.
3. A cooling main 24 in. in diameter, which was originally the foul main in the inclined retort house. It is only necessary to bring this unit into operation during the summer months.

The exhauster house is 65 ft. long by 25 ft. wide, 20 ft. high from yard level to eaves, and contains one Bryan-Donkin turbo exhauster (capacity 200,000 c.ft. per hour), and two sets of Bryan-Donkin rotary exhausters, the capacity of each set being 200,000 c.ft. per hour.

The two tar extractors are of the Pelouze & Audouin type, and have a capacity of 2 million c.ft. per day.

Four sets of Walker's purifying machines complete the wet purification plant, the capacity of these being 5 million c.ft. per day.

PURIFIERS.

The dry purification plant consists of four sets of oxide boxes and catch boxes.

No. 1 Set.—Four boxes, each 30 ft. by 20 ft. by 6 ft. with water-luted covers and Weck valves. The oxide is elevated to the top revivifying floor, and the covers are raised by hydraulic power.

No. 2 Set.—In this set there are four boxes, each 50 ft. by 30 ft. by 6 ft., fitted with a Pickering connectionless valve. The oxide handling plant consists of two elevators, two band conveyors, and oxide disintegrator, all electrically driven, and two Morris cranes for raising purifier covers.

Catch Boxes.

Nos. 1 and 2 Sets Purifiers.—The gas from Nos. 1 and 2 sets of purifiers passes through four catch boxes, each 30 ft. by 20 ft. by 6 ft., fitted with a Weck valve. These purifiers have water-luted covers which are raised by hydraulic power.

Nos. 3 and 4 Sets.—Each of these sets consists of four boxes, 30 ft. by 20 ft. by 6 ft. deep. All these boxes have water-luted covers, and to each set there is a centre valve. The covers are raised by hand cranes. The gas from Nos. 3 and 4 sets of purifiers passes through two catch boxes, each 30 ft. by 20 ft. by 6 ft.

The station meters are of the wet drum type, and have a total capacity of approximately 8 million c.ft. per day. No. 1 station meter is by Messrs. J. Milne & Sons, Leeds, 118,000 c.ft. per hour; No. 2 meter by Messrs. J. & J. Braddock, Oldham, 75,000 c.ft. per hour, and No. 3 meter by Messrs. J. Milne & Sons, Edinburgh, 132,000 c.ft. per hour.

No. 1 meter is situate in Dewsbury Road Yard, and is next to the carburetted water gas meters. Nos. 2 and 3 meters are housed in Meadow Lane Yard.

Steam Plant.—The new boiler house contains two Lancashire boilers, each 30 ft. by 8 ft., with forced draught furnace; working pressure, 120 lbs. per sq. in. The old boiler house contains two Lancashire boilers, each 30 ft. by 7 ft., and one Lancashire boiler 30 ft. by 8 ft. These three boilers have a working pressure of 65 lbs. per sq. in.

Pump House and Hydraulic Plant.—This building contains a battery of tar and liquor pumps, steam driven. In addition, there is an 80-B.H.P. hydraulic pump by Messrs. J. Evans & Sons, working at a pressure of 700 lbs. per sq. in., having a capacity of 7000 gallons per hour. Outside the pump house there are two hydraulic accumulators with 9-in. diameter rams. Hydraulic power operates the bottom doors of the Dessau retorts, two lifts of the Dessau plant, two capstans, and three wagon tippers—one for the Dessau plant and two for the inclined conveyors feeding the coal store.

Machine Shop.—A new and larger shop has been fitted up and equipped with additional machines, all electrically driven. The machines in this shop are as follows: 12-in. lathe, 7-in. lathe, punching and shearing machine, planer, shaper, radial drill, power hack saw, screwing machine, and overhead 2-ton travelling crane.

The smith's shop is equipped with three smiths' hearths and a 5-cwt. steam hammer. Forced draught is obtained by electrically-driven high-speed fan.

The machines in the joiners' shop consist of a circular saw, a planer, and an Elliot woodworker—all electrically driven.

Pan Ash Washer.—Waller's "Retriever" plant deals with all pan ash from the vertical retort house, and can also be used for washing coke breeze. The capacity is 4 tons of pan ash per hour, and 2½ tons of coke breeze per hour.

CARBURETTED WATER GAS PLANT.

This plant is capable of producing 5¼ million c.ft. of gas per day, and consists of four units: Nos. 1 and 2 sets, by Messrs. Davison & Partner, London; capacity of each, 1½ million c.ft. per day. No. 3 set, by the Economical Gas Apparatus Construction Company, Ltd., Westminster; capacity, 750,000 c.ft. per day. No. 4 set, by Messrs. Humphreys & Glasgow, Ltd., London; capacity, 1½ million c.ft. per day. Nos. 1 and 4 machines are equipped with grit arresters.

In addition, a supply of coke oven gas is obtained by means of a high-pressure main from the Middleton Estate and Colliery Company, Ltd. The gas after being measured mixes with the carburetted water gas stream at the inlet to exhausters.

Exhauster and Engine House.—This is 80 ft. by 30 ft. and 16 ft. high, and contains one Bryan-Donkin steam-driven twin exhauster; capacity, 200,000 c.ft. per hour. Two Waller's exhausters; capacity, 80,000 c.ft. per hour each. The connections of one are so arranged that this set can also be used for pumping gas to the New Wortley Works. One Bryan-Donkin electrically-driven exhauster; capacity, 100,000 c.ft. per hour. This set is used solely for boosting gas to the New Wortley Works.

Blowing Sets.—No. 1 and 2 sets each consist of Sturtevant blowers driven by 40-B.H.P. Tangye vertical steam engines. No. 3 set, Keith-Blackman fan, driven by 55-B.H.P. Brotherhood steam turbine.

Tar Fog Extractor.—The Crossley tar fog extractor is electrically driven and takes the last traces of tar out of the gas before passing through the purifiers.

Condensing Plant, &c.—The carburetted water gas first passes through air-cooled condensers arranged in two batteries, there being four condensers in a battery, 5 ft. diameter by 40 ft. high. Each condenser contains seven air tubes 16 in. in diameter. Two Clapham patent "Eclipse" water-tube condensers, having a capacity of 3 million c.ft. of gas per day, complete the condensing plant. Before entering the relief holder, the carburetted water gas passes through four scrubbers, each 5 ft. 6 in. diameter by 30 ft. high, having wood filling.

Relief Holder.—Three-lift holder in a steel tank, 57 ft. in diameter by 20 ft. deep; capacity, 150,000 c.ft.

Purifiers.—These deal with all the carburetted water gas and coke oven gas and consist of four boxes, each 43 ft. by 43 ft. by 6 ft. deep. The gas flow is controlled by a Pickering connectionless valve, and a hydraulic crane is used for lifting the box covers and the oxide skips. The catch boxes are each 35 ft. by 30 ft. by 6 ft., with Pickering valve. The oxide handling plant for these boxes consists of an elevator and band conveyors, all electrically driven. A Morris crane, operated by hand, is used for raising the covers.

Station Meters.—These meters are all of the wet drum type, and are as follows: Carburetted water gas No. 1 meter, by Messrs. J. Milne & Sons, Leeds; capacity, 85,000 c.ft. per hour. Carburetted water gas No. 2 meter, by Messrs. Parkinson & Cowan, Ltd.; capacity, 130,000 c.ft. per hour. Coke oven gas meter, Messrs. J. & J. Braddock; capacity, 75,000 c.ft. per hour.

Coke Handling Plant.—The coke handling can be carried out by skips loaded from wagons at yard level and raised by hydraulic hoist to the operating stage; or coke can be unloaded from wagons into a receiving hopper with roller feed, and deposited by means of bucket elevator and conveyor into four storage bunkers above the operating stage. The bunkers have a capacity of 50 tons.

Oil Storage Tank.—This is 35 ft. in diameter by 30 ft. deep, and has a capacity of 180,000 gallons. Compressed air is used for unloading the oil tank wagons into the storage tank, a Westinghouse compressor being used for this purpose.

Boiler House.—The house contains three Lancashire boilers, each 30 ft. by 8 ft. which are fitted with Crosthwaite's forced draught furnaces. The working pressure of the boilers is 125 lbs. per sq. in. The boiler feed pumps are a Weir and a Worthington duplex. The overhead water tank is 35 ft. by 55 ft. by 5 ft. deep, and has a capacity of 66,000 gallons.

Hydraulic Plant.—The hydraulic pump is by Messrs. Hay-

wood Tyler & Co., and the accumulator by Messrs. Goodall, Clayton, & Co., Ltd. The working pressure is 750 lbs. per sq. in.

Pan Ash Washer.—This plant is by Messrs. Gordon Harvey, of London, and consists of elevators, jigging screens, steel bunkers for large and small ash, reinforced concrete hopper for clinker (50 tons capacity), settling tank, trommel, and picking belt (24 in.). This plant deals with the whole of the ashes from the retort houses and the carburetted water gas plant, and is driven by a 30-H.P. electric motor, except the clinker elevator, for which a 5-H.P. motor is employed. A centrifugal pump, having a capacity of 300 gallons per minute, circulates the wash water.

Mortar Plant.—The mortar mills are by Messrs. T. C. Fawcett, Ltd., of Leeds, and the Brightside Engineering Company, of Sheffield. Both have 7 ft. diameter pans, and are driven by a 20-H.P. electric motor. The electricity supply for the works is taken from the City of Leeds Electricity Department. The panel house is built on a superstructure, and contains a switchboard with distribution panels.

The Laboratory.

The laboratory is situated at the Meadow Lane Works. It is on the ground floor of the main block of buildings facing Meadow Lane, and has a total floor area of 129 square yards. Ventilation is well provided by five shafts which pass through the first floor and discharge into the under-drawings of the roof. The lay-out consists of a preparation room, laboratory, balance room and library, private office, photographic dark room, and store room.

Preparation Room.—This is equipped with grinder, emery wheels, 6-in. Drummond lathe, air compressor, all of which are power driven, also a metal planer, and a vacuum pump and glass-blowing bench.

Laboratory.—Separate working benches are provided for each chemist, and are equipped with high and low pressure gas, air pressure, and vacuum. The construction of the benches is such that all plumbing work can be easily inspected at any time. Three fume cupboards are provided, and also a large stone working bench covered by a canopy connected to the main flue; these provide ample accommodation for special chemical operations and furnace work. The laboratory is well equipped with general chemical and physical apparatus, also special instruments and apparatus for industrial testing.

Balance Room.—The delicate chemical balances stand on slate slabs supported on brick piers.

Library.—This contains books of reference used by the laboratory staff, and also a number of technical books; these can be borrowed by any employee of the Gas Department.

The work carried out consists of works routine tests for ammonia, sulphur, naphthalene, sulphuretted hydrogen, calorific values, temperatures of settings, furnace gas analysis, oxide tests, liquor, tar and gas oil tests, analysis of coal as received, and complete analysis of the various gases, &c. Refractory materials, stores, such as paints, lubricating oils, soaps, &c., are examined periodically. Chemical and physical problems in connection with the Distribution Department and the Meter and Maintenance Department, lamp testing, and the obtaining of illumination data for the Street Lighting Department are also dealt with by the laboratory staff. Photographic records of work in progress in all departments are made and filed, and have proved a most useful development. The number of chemists on the staff is ten.

Coal Testing Plant.—This is a complete unit carbonizing one-hundredth of a ton; and all coals used on the Works are tested at this plant.

The calorimeter room at Meadow Lane contains one Fairweather recording calorimeter; the calorimeter room at Dewsbury Road contains two Beasley recording calorimeters, and one Boys calorimeter, and the apparatus for the Gas Referees' sulphur and ammonia tests; and the calorimeter room at the water gas plant contains three Beasley recording calorimeters and one Boys calorimeter. The supplies of gas are so arranged that any recorder can be connected to any one of the gas streams without any possibility of contamination of one stream of gas by another.

New Wortley Works.

These works are situated on the south side of the River Aire, and cover an area of 13 acres. All traffic per rail for these works is dealt with by the London, Midland, and Scottish Railway Company, who provide sidings exclusively for the Gas Department, with a working accommodation for 130 wagons. The wagon traffic from the sidings into the works is handled by the Department's locomotives, and in the winter months deal with 500 tons of coal and 100 to 200 tons of coke per day. The length of permanent way inside the works is approximately 2500 yards, and, of this, 1400 yards has been recently relaid.

Carbonizing Plant.

No. 2 Retort House.—This house is 340 ft. long by 86 ft. wide. Gas manufacture was commenced in it in 1885, and until the end of 1896 the stoking was done by manual labour. Messrs. Sir Wm. Arrol & Co.'s system of hydraulic stoking machinery was then introduced, consisting of four charging and four drawing machines, worked by hydraulic power; additionally two steam-driven coal breakers and elevators, and a 20-ton coal bunker were installed. The coke was drawn into small one-wheel iron barrows, and taken into the yard by manual labour. In 1913-14, two hydraulic discharging machines were installed, displacing the four drawing machines; twelve-hour charges were commenced, and the coke was discharged into large two-wheel barrows, at one side of the bench only. In 1915, four hydraulic wagon tippers were added to the equipment of the house. In 1916, electric telpherage and coke screening plant was installed, comprising a low-level track with two telphers and large tipping skips in the house, slaking tank, coke screens, skip-pit with automatic skip loading devices, high-level track, with two telphers and skips, overhead bunkers, capable of holding 300 tons of coke, and a track 300 ft. long under which 6000 tons of coke can be stored.

There are 27 beds of 8 retorts, each 20 ft. long, in three benches, all on the regenerative principle, and having manufacturing capacity of approximately 4 million c.ft. of gas per 24 hours of 470 B.Th.U. value.

No. 3 Retort House (Inclines).—This house, built in 1903, is 290 ft. long, 70 ft. wide, and 55 ft. from yard level to the eaves of the roof. The installation comprises two coal receiving hoppers, duplicate sets of 40 tons per hour coal breakers, elevators, push-plate conveyors, and overhead bunkers, capable of holding a 24 hours' supply of coal. The whole of the coal handling plant is driven by 70-B.H.P. "National" gas engines.

Attached to the overhead coal bunkers are the measuring chambers, by means of which charges of coal varying in weight from 4 to 7 cwt. can be placed in the retorts. The coal is delivered into the retorts from the measuring chambers by charging chutes which run along rails from bed to bed.

There are two benches of retorts, each containing 11 beds of 8's on the regenerative principle, a total of 176 through retorts; the manufacturing capacity of this house is approximately 3,500,000 c.ft. of gas per 24 hours of 470 B.Th.U. value. The retorts are set at an incline of 32° to the horizontal and are 20 ft. long. There are two chimneys, each 120 ft. high, one for each bench of retorts.

Condensers.—There are six sets of atmospheric condensers, each of 1½ million c.ft. per day capacity, and one set of water-tube condensers capable of cooling 3 million c.ft. per day from 140° to 65° Fahr.

Exhauster House and Exhausters.—The exhauster house is 70 ft. long by 20 ft. wide, and contains three sets of steam-driven exhausters, each of 200,000 c.ft. per hour capacity.

Tar Extractors.—There are two Livesey tar extractors, one 5 millions and the other 4 million c.ft. per day capacity, worked in parallel.

Ammonia Scrubber-Washers.—There are three rotary ammonia scrubbers on the Holmes brush principle, each capable of abstracting the ammonia from 3 million c.ft. of gas per 24 hours, worked in parallel.

Purifiers.—There are sixteen purifying boxes, each 30 ft. by 20 ft., in four sets of four boxes each, and two catch boxes of the same size for abstracting the sulphuretted hydrogen from the gas. Two sets of the boxes are controlled by centre valves, the other two sets and the catch boxes by Weck valves.

Meter House and Station Meters.—The meter house is 70 ft. long by 28 ft. wide, and contains four station meters, each of a capacity of 100,000 c.ft. per hour. One of the meters is also in connection with the Meadow Lane Works; and carburetted water gas or mixed gas can be received and measured prior to mixing with the coal gas made at New Wortley.

Gasholders.—There are four 3-lift gasholders, each of a capacity of approximately 600,000 c.ft.. No. 3 holder was re-built in 1923; No. 2 holder was thoroughly overhauled, cleaned out, the columns straightened, &c., in 1925; No. 4 holder was thoroughly overhauled and the inner lift renewed in 1927; and No. 1 holder was re-built in 1928.

Station Governors.—There are two 36-in. diameter and two 20-in. diameter station governors for controlling the pressures on the supply of gas to the consumers.

Workshops.—In order that the craftsmen on the works may be housed in one building, the workshops have been extensively remodelled. For this purpose, the site occupied formerly by the offices, stables, &c., in the top yard was cleared, and has been added to the old fitters' shop. The new workshop is 96 ft. long by 30 ft. wide, and allows of all the machine tools to be brought together. Arrangements have been made also whereby the locomotives can be run into the shop for repairs. The smiths' and joiners' shops remain substantially as they were, but, being in the same block of buildings as the new shop, are

very conveniently situated; the over-all length of the shops is about 170 ft. by 30 ft. wide.

Benzole Plant.—In 1915 the plant was erected by Messrs. Simon Carves, Ltd., for abstracting and rectifying the benzole and toluole from the gas for the manufacture of high explosives, which plant was purchased by the Gas Committee in 1919 for the production of motor spirit. The crude portion comprises oil storage tanks, rotary brush oil scrubbers, debenzolizing stills, coolers for reclaiming the creosote oil, condensers for liquifying the crude benzole vapours, and collecting tanks for the crude benzole. The rectifying portion comprises a primary and secondary still (each fitted with fractionating column, analyzer, and condenser), a 2500-gallon chemical washer, and overhead storage tanks for the finished products. There are the necessary oil and water pumps for circulating these liquids through the stills, &c. The plant is capable of working and rectifying 1500 gallons of crude benzole per 24 hours.

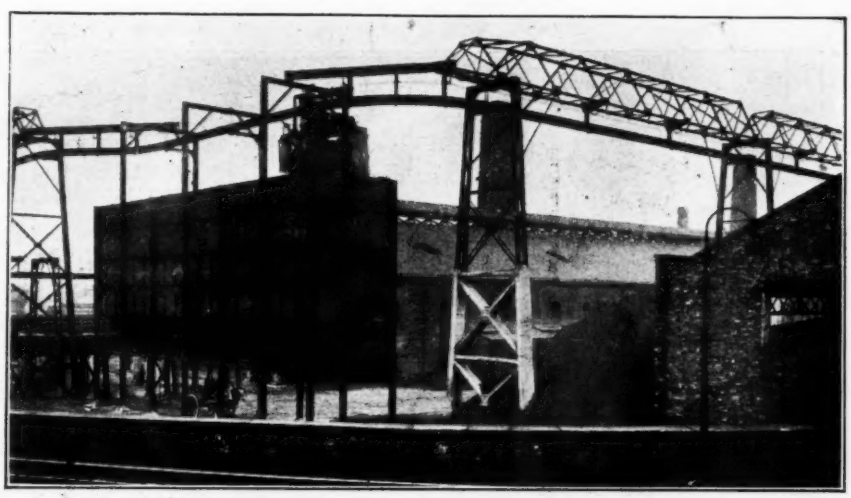
Boilers.—The steam required for works use is generated in Lancashire boilers. No. 1 range contains two 30 ft. by 7 ft. and one 25 ft. by 8 ft. boilers, and No. 2 range contains three 30 ft. by 8 ft. boilers.

Coal Stores.—There are three covered-in coal stores, including the old No. 1 retort house, which hold 14,000 tons of coal.

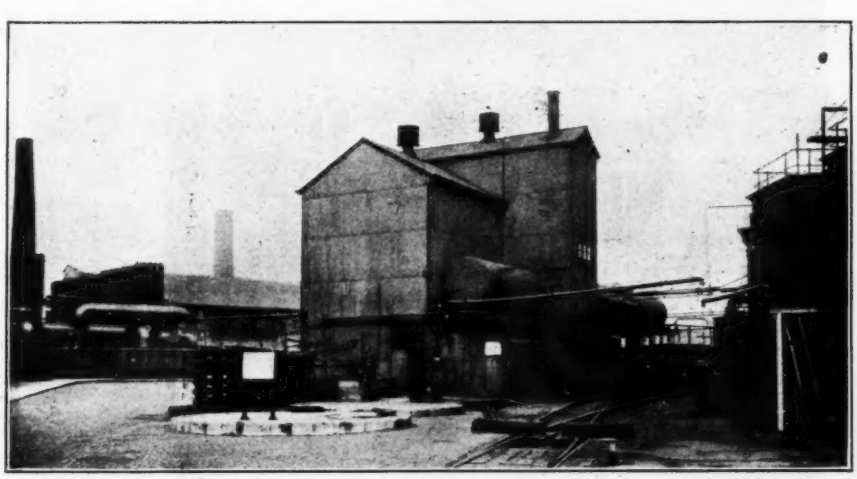
Tar Wells.—About six years ago the construction of a new underground tar and liquor well in the top yard was completed. The well is built of concrete, is 90 ft. long, 33 ft. wide, and 11 ft. deep, and holds 1000 tons of tar and liquor. There is also another underground well; capacity 1200 tons.

Pan Ash Plant.—A mechanical pan ash and breeze washing plant has been erected for recovering usable coke from the refuse from the retort house producers, and making washed breeze for smithy use. The plant is working well, and is a success in every way.

Laboratory.—There is a laboratory in the top yard, containing scientific instruments for controlling the carbonizing processes, pyrometers, recording vacuum, and pressure registers, &c., where the daily tests for impurities, &c., and chemical analyses are carried out. A range of four Beasley recording calorimeters is constantly at work showing at a glance the qualities of the gas being made, received, and supplied to the consumers. These instruments are checked daily by means of a standard Boys calorimeter.



NEW WORTLEY WORKS.



NEW WORTLEY WORKS—ANOTHER VIEW.

Gas Mains and Distribution Department: Plant at the Various Outstations.

DEWSBURY ROAD.

Holders—

No. 1	529,000 c.ft. capacity—3 lifts.
No. 2	5,163,000 ,, ,, ,,
Total storage	5,692,000 ,,

Inlet and outlet, 36 in. diameter.

Governors.—There are three on this Station, one of 24-in. diameter supplying the centre of the city; one supplying Hunslet and the south side of the city, 36 in. in diameter; and one supplying Dewsbury Road and the Beeston area, also 36 in. in diameter.

Compressors.—Two 20,000 c.ft. and two 4000 c.ft. per hour. These compressors supply the City Markets, and a few main streets in the centre of the city, with high-pressure gas at 70 in. pressure (water gauge). A booster is used for assisting pressures when the gasholders are in the first lift.

This Station is connected to the New Wortley Works and the Sheepscar Gasholder Station by 14-in. mains. Gas is de-

livered by pressure from here to New Wortley, and pulled by exhauster to Sheepscar.

SHEEPSCAR.

Holders—

No. 1	795,000 c.ft. capacity—3 lifts.
No. 2	1,951,000 ,, ,, ,,
Total storage	2,746,000 ,,

Inlet and outlet, 30 in. diameter.

Governors.—There are two governors, each of 24 in. diameter. One supplies the Roundhay district and the other the Meanwood district. There is also a 12-in. high-pressure independent steel main from this station supplying an 18-in. underground governor in the Scott Hall Arterial Road, Moortown, which is used for the purpose of boosting up the mains in this area.

Exhausters—

No. 1	130,000 c.ft. per hour driven by 14-H.P. Crossley gas engine
No. 2	90,000 ,, ,, ,, ,, 25-H.P. electric motor
No. 3	150,000 ,, ,, ,, ,, 25-H.P. Crossley gas engine

This station is connected to Meadow Lane and New Wortley Works by 14-in. mains. The connections are so arranged that gas may be pulled from any station by any exhauster.

KIRKSTALL.

Holders—

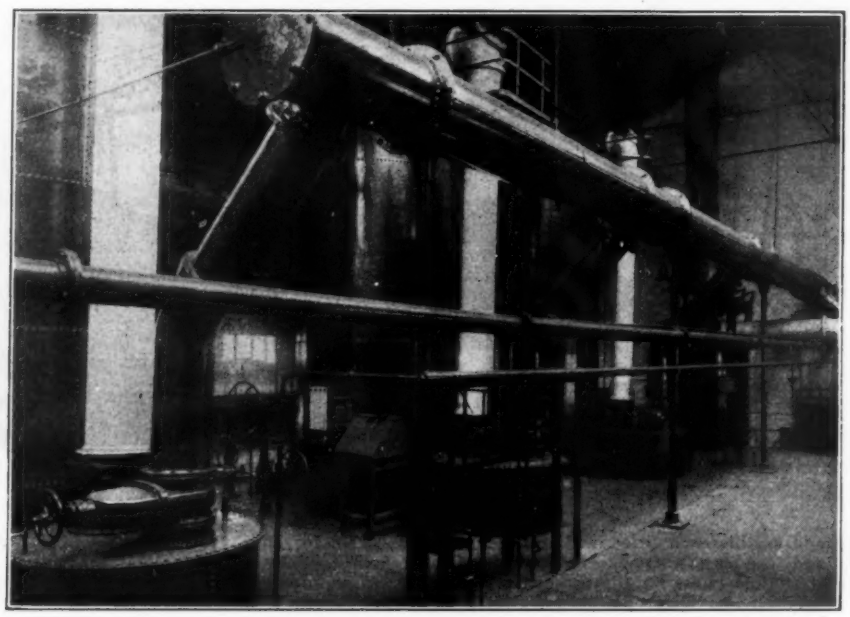
No. 1	1,250,000 c.ft. capacity—3 lifts.
No. 2	2,476,000 ,, ,, ,,
Total storage	3,726,000 ,,

Inlet and outlet, 30 in. diameter.

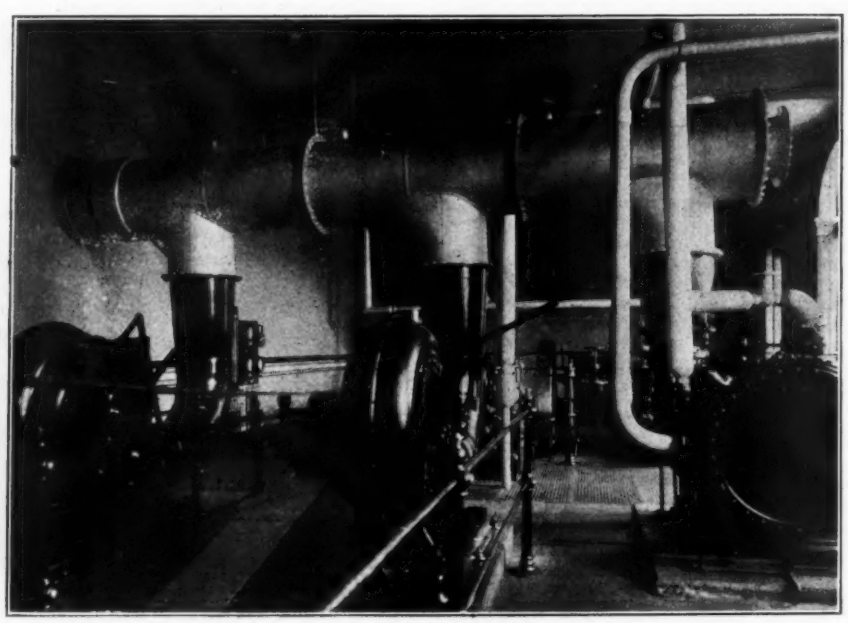
Governor.—One 24-in. supplies Kirkstall and Headingley.

Compressor.—Eighty thousand c.ft. per hour, 170 R.P.M., used for boosting gas to the Rodley outstation when the holders are in the bottom lifts; driven by 45-H.P. gas engine, 165 R.P.M.

Exhausters.—Two 130,000 c.ft. per hour exhausters used for pulling gas from the New Wortley Works, driven by 45 and 40 H.P. gas engines respectively.



WATER GAS PLANT AT DEWSBURY ROAD—CHARGING STAGE.



WATER GAS PLANT AT DEWSBURY ROAD—ENGINE HOUSE.

This station is connected up to the New Wortley Works and to the Rodley Governor Station by 14-in. and 10-in. mains.

LOW WORTLEY.

Holder—

1,091,000 c.ft. capacity—3 lifts.

Inlet and outlet, 18 in. diameter.

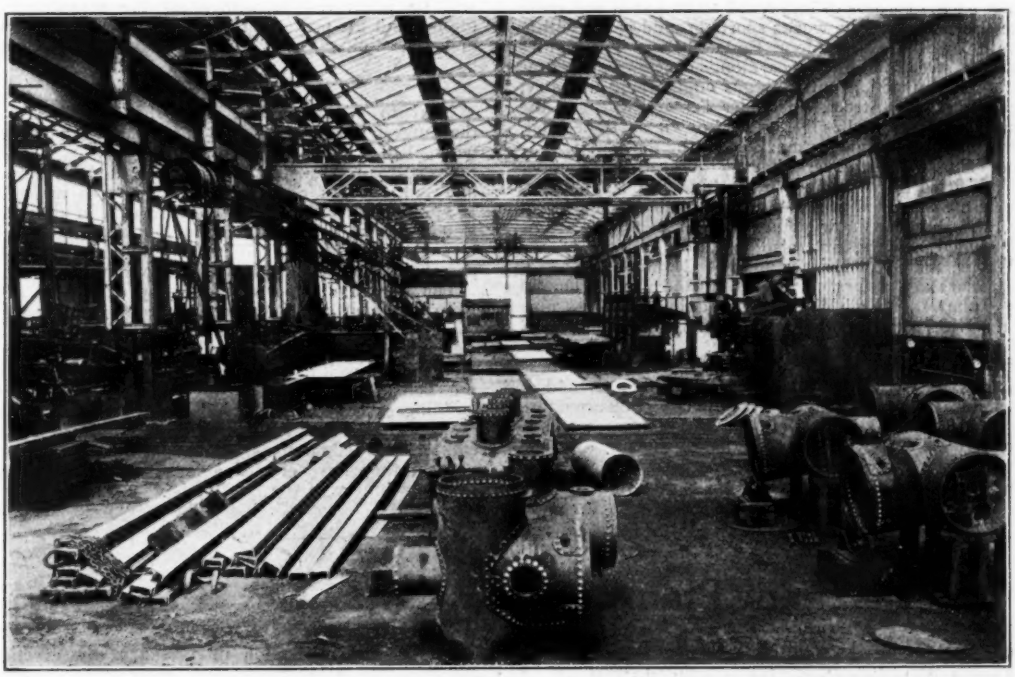
Governor.—18-inch weight-loaded governor supplying the Low Wortley and Farnley areas.

Exhausters.—Two 40,000 and 50,000 c.ft. per hour capacity.

The total capacity of the gasholders of the city is 15,796,000 c.ft.

The Works of Messrs. Clayton, Son, & Co., Ltd.

Among the Works which are to be open for the inspection of Members of the Institution next week are those of Messrs. Clayton, Son, & Co., Ltd., whose name is so well known throughout the Empire as Builders of Gasholders and other Engineering Structures.



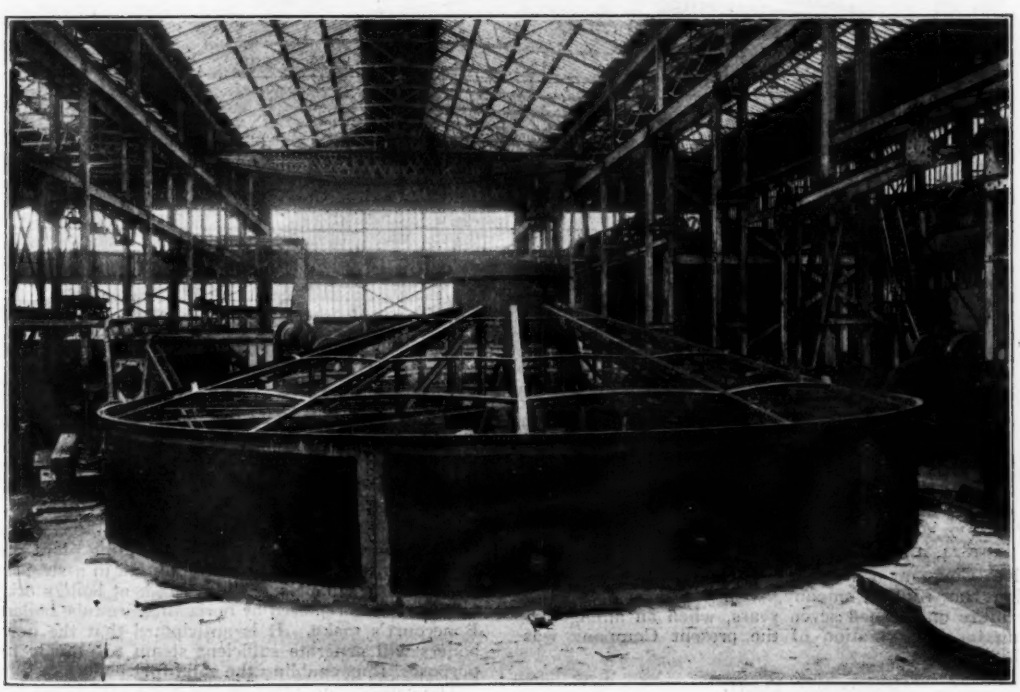
VIEW OF BAY AT THE MOOR END WORKS OF MESSRS. CLAYTON, SON, & CO., LTD.

The late Mr. Lawrence Clayton, the founder of the firm, settled down with his father in Hunslet in the year 1862, he being then 20 years of age. It had been a question often debated between themselves of the younger engineer emigrating to Australia or settling down in some suitable industrial area; and the decision eventually went for Hunslet.

It was a day of small things, but a start was made, and eventually, in 1864, the first order for a gasholder was received —a single lift, 30 ft. in diameter by 12 ft. deep, for Spilsby, Lincolnshire.

The business grew and Mr. Clayton's faith in the future of the gas industry was so great that in 1875 he arranged for the purchase of an estate of 18 acres on the borders of Hunslet, and there planted down the nucleus of the present important works.

It is evidence of the confidence reposed in Clayton, Son, & Co. by those best qualified to judge of the firm's capabilities



VIEW OF BAY AT THE PEPPER ROAD WORKS OF MESSRS. CLAYTON, SON, & CO., LTD.

that some of the most important of the early orders were from the Corporation Gas Department of Leeds itself. But the firm's reputation spread, and in time constructional engineering work was carried out in almost every part of the Empire, and, indeed, of the whole world. In the course of their history, for example, they have made and erected gasholders and oil and water tanks in places as widely separated as Stockholm in the north and the Falkland Islands in the far south, Winnipeg in the west, and New Zealand.

The gasholder works are situated at Moor End, Hunslet, which is just on the borders of industrial south Leeds and quite close to the open country, the works sports ground being within three minutes' walk of the Moor End Works. The names of some of the streets and terraces alongside the works bear evidence of their connection with the gas engineering industry, being named Gasholder Street, Gasholder Terrace, &c., and the district immediately around is generally known as Boilerland. The industry has truly made its mark upon the district!

The Moor End Works cover about 7 acres, mostly under cover, and are fitted up with modern machinery and appliances for the efficient and expeditious manufacture of gasholders of every type, and there are now going through the shops frame and spiral guided holders, and also waterless holders of the "M.A.N." type, for Great Britain and the Colonies.

Some few years ago a further 7 acres of land was purchased quite near to the Moor End Works, and equipped for the purpose of a receiving and despatching station for materials, and for the storing of erecting plant and tackle.

The cricket and football field of the Sports Association is situated on this Estate, and the Cricket Team are the holders of the Yorkshire Central League Trophy. Various welfare work is undertaken, and Benevolent and Convalescent Funds are administered. The Works Ambulance Team are the holders of the following Shields: Leeds Corps of the St. John Ambulance Brigade Trophy; Midland Area of the West Riding of Yorkshire Ambulance Trophy; and the Shipley Division Ambulance Trophy.

In 1906 came an important addition to the scope of the Company's activities, for in this year were laid down the pipe works in Pepper Road. Large contracts for the construction of welded and riveted steel water mains have since been carried out for the Metropolitan Water Board and the Water Departments of Manchester, Leeds, Aberdeen, and other big towns. These works are devoted principally to the manufacture of welded steel mains, from 18 in. diameter upwards; and visitors will be interested in witnessing the actual welding of the mains, and the process of coating them internally with cement, and other linings, as preventatives against corrosion.

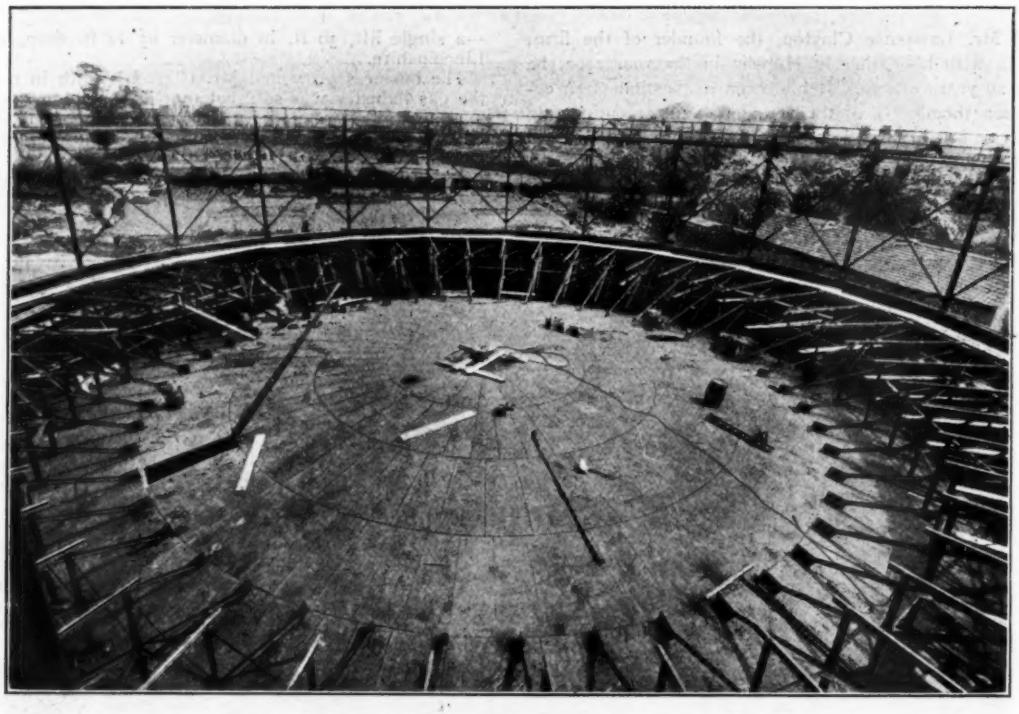
The Clayton Group.

Next to Clayton, Son, & Co. itself, the Company with the longest history is Deighton's Patent Flue and Tube Company, Ltd., which was formed in 1896. It has works in Pepper Road, Hunslet, where corrugated furnaces for marine and land boilers of many different types are manufactured. It was in connection with this firm that in 1903 the Yorkshire Patent Steam Wagon Company, another of the Group, was formed. Works were erected on adjoining land for the purpose of manufacturing steam transport wagons.

The fourth member of the Group existed as a private firm from the year 1908, and became a company in 1914. This was Goodall, Clayton & Co., who specialize in the manufacture of elevating and conveying machinery for handling every class of material, as well as coal screening and separating plants, picking belts, tipplers, pit headgears, gantries, steel structural buildings, roofs, &c. Messrs. Goodall, Clayton & Co. also make complete gas retort installations on the horizontal, vertical, or inclined systems. Throughout this country, and also abroad, they have erected a large number of plants equipped with machinery of the latest type.

Works and Plant of the York Gas Company.

The Directors of the York Gas Company have invited members of the Institution interested in the erection of a Klönne Waterless Gasholder to visit their Works during the course of the Institution Conference next week.



VIEW OF PISTON TOP TAKEN FROM THE FIRST GALLERY.

York was first supplied with gas by the York Gas Light Company in 1824, the works being situated on the existing site. A rival Company was, however, promoted in 1836, the York Union Gas Light Company, with works at Hungate; but this venture only lasted seven years, when an amalgamation leading to the formation of the present Company was brought about.

Carbonizing Plant.

The carbonizing plant consists of an installation of forty 33-in. Glover-West new model vertical retorts, equipped with West's lip-bucket coal and coke handling plant and the usual appurtenances, the whole being housed in a steel framed building with brick panels. The waste-heat boilers originally fitted are now being replaced by horizontal fire-tube boilers of Spencer Bonecourt's make. It is anticipated that the new waste-heat boilers will generate sufficient steam to provide for all works purposes, thus enabling the solid-fuel boilers to be shut down.

The carbonizing plant in the horizontal retort house consists of 21 settings of size 24 in. by 18 in. ⏀ retorts 18 ft. long,

capable of producing 2½ millions per day. Six settings are now being reconstructed by Messrs. Drakes, Ltd., of Halifax, for gaseous firing by a "Trefois" external producer using coke breeze only. Both the producer gas and secondary air will be preheated by independent tubular regenerators, the producer gas pre-heater being situated in the space normally occupied by the internal producer and dumb chamber. The producer will gasify 12 tons of coke breeze daily and is self-contained, with ash removal gear, blowing and exhausting plant, similar to those installed at the new Partington works of the Manchester Corporation and already described in the "JOURNAL." [See issue for May 8, 1929, p. 337.]

CHARGING MACHINES AND COKE HANDLING.

There are two charging machines, one being the new central-chain Guest Gibbons machine, and the other the combined D.B. stoker of the usual type. Coke from the horizontal house is handled on a D.B. conveyor and rotary screen.

The exhauster house, boiler house, and pump house will ultimately form a centralized power plant unit. At present, however, only the exhauster house and pump house are approaching completion. When finished the layout provides for a tower-shaped building at the end of the exhauster house, which will form a support for a large water tank, while the lower portion of this building will be used to house electrical generating plant.

The exhausters are by Messrs. Wallers; one of which, a 200,000 c.ft. per hour machine, was engined by Messrs. Robey's, of Lincoln. In order to obviate constant supervision by an attendant, full use has been made of automatic control gear and recording instruments.

Two Cochran boilers, 16 ft. 6 in. high by 8 ft. 6 in. in diameter, fitted with "Turbine" grates for burning low-grade fuel, at present provide steam for the exhausters and pump house; but, as before mentioned, these will be shut down when the new waste-heat boilers are brought into operation.

STATION METER.

This is a 5 million per day "Connersville" meter, by Messrs. W. C. Holmes & Co., fitted with the P.V.T. recorder. It has been working since September, 1928, with entirely satisfactory reults.

A Holmes' rotary scrubber for the extraction of naphthalene is installed at the inlet of holders. There are two small Davison & Partners C.W.G. sets, fitted with the Tipton Tub and Tube Company's grit catchers. All water required for works purposes is obtained from the River Foss, that required for boiler feed being subsequently softened to zero in a Kennicott lime and soda plant followed by a Zeolite softener.

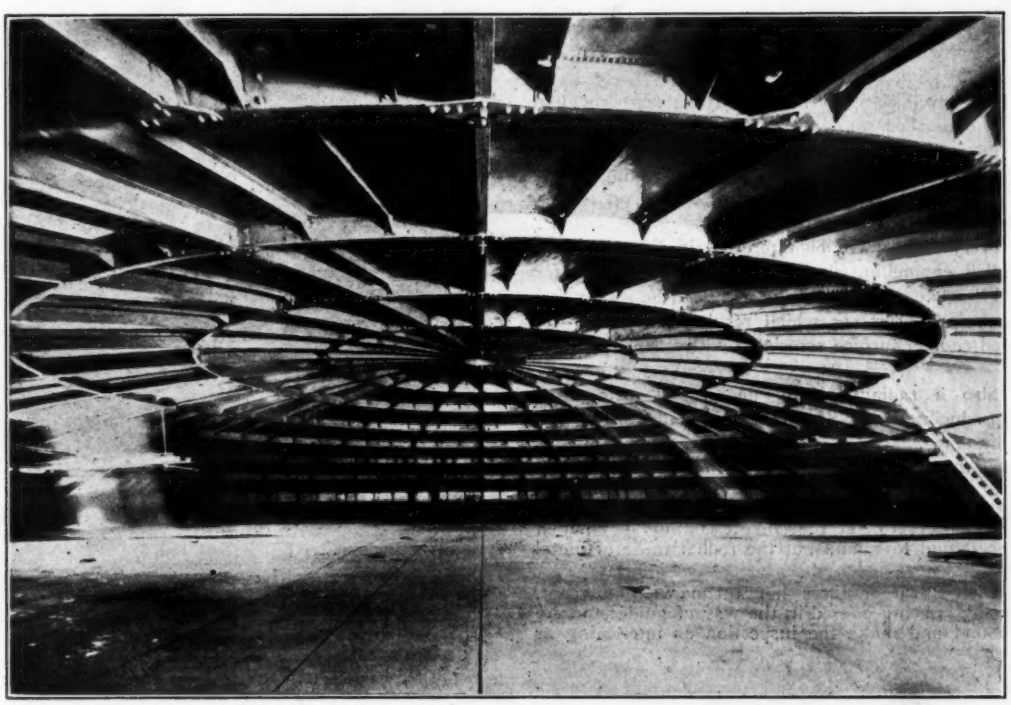
GASHOLDERS.

On the Old Works site there are two gasholders, constructed in 1857 and 1867, each of 400,000 c.ft. capacity, still in use. They will be put out of commission as soon as the Klönne holder is completed. There are two holders of 750,000 and 1 million c.ft. capacity respectively on the New Works site, close to which the new Klönne holder of 2 million c.ft. capacity is now being built.

The foundations for the Klönne holder were commenced in July of last year, and take the form of an inverted **T** shaped ring in reinforced concrete. The foundations are designed with a factor of safety of 4 in the working stresses and 1½ against up lift on the windward side. Under extreme conditions with a hurricane blowing and heavy snow the loading of the ground would be of the order of 2 tons per sq. ft. on the base of the ring. Sufficient progress has been made with the erection to enable members to see the salient features of this type of holder, and, indeed, at the time of the meeting it is anticipated that the piston will be air-borne.

CONSTRUCTION OF THE KLONNE HOLDER.

This being the first example of the Klönne holder in this country, a few notes on details of construction are here appended. The shell of the holder is truly circular in form, 126 ft. in diameter, and 180 ft. 6 in. in height. Twenty-four sheets form the circumference of the shell, and there are 38 tiers of sheets in the height. These side plates, which are ⅜ in. thick, are curved to the required radius of the holder, and are rivetted to the vertical edges of the 27 upright stanchions. Moreover, the horizontal joints are covered by, and rivetted to, 4 in. by 2 in. curved channels, which form butt straps and stiffen the structure. In addition, to maintain true circularity of the casing, there are five circumferential galleries, which not only give great strength, but form convenient means of access for painting and inspection. The top of the shell is covered in by a domed roof and turret.



VIEW OF INTERIOR OF KLÖNNE GASHOLDER, SHOWING RAFTERS AND PURLINS.

PISTON.

The piston in the Klönne holder is not flat, as in other types of dry gasholders, but is domed (see illustration) with a total camber in the centre of about 11 ft. The piston framing consists of 24 main and 24 secondary rafters, all of 7 in. by 3 in. channel. Between the centre ring and the curb there are six concentric rings of purlins equally spaced and all formed from 7 in. by 3 in. channel. The ⅜ in. piston sheeting is attached to this framework by close pitched rivets.

At the outer edge of this moving piston is carried the annular cup, which is filled with oil and forms the seal for the circumferential elastic apron plate. The rubber piston ring, which is composed of six layers of specially reinforced rubber fabric, is firmly secured to the apron plate. Each layer of the rubber piston ring is approximately 4 in. wide by 1 in. thick, extending to the full circumference of the holder, each layer breaking joint with the next above. The rubber is pressed firmly against the outer shell by means of 384 levers and counterbalance weights having a mechanical advantage of 5 to 1. To reduce friction between the packing ring and the shell to a minimum, special lubricators are provided for forcing in a lubricant non-injurious to rubber. This lubricant only

requires replenishing at long intervals. The bottom layer of rubber has a goat-skin facing to prevent the slightly deleterious effect of gas upon rubber. The oil in the cup lasts an indefinite period, and no pumping is required with this type of holder.

The skirt of the piston, which extends 16 ft., is formed of very strong vertical sheets with suitable cross bracing. At the top and bottom of the piston skirt are attached the 192 hard wood guide rollers. An outer staircase tower is provided, firmly attached to each gallery of the holder, opening on to the roof, where there is a gangway leading to the turret. An electric lift with remote control is housed in the turret for giving access to the piston from the top. The speed of the lift is such that no harm will result if both the human element and safety devices fail to stop the downward travel of the lift before it strikes the buffers, on the roof of the piston. Guide ropes with counterbalanced weights outside the shell are also provided to prevent any unpleasant rotation of the cage while suspended in the holder.

A dial indicator 10 ft. in diameter, which will show the contents of the holder at any time, will be fitted at a suitable position on the staircase tower.

The Works of Wilsons and Mathiesons, Ltd.

Visitors to Leeds during Institution Week will have the opportunity of visiting the Works of Messrs. Wilsons & Mathiesons, Ltd. (Radiation Ltd., Proprietors), who are making arrangements so that those interested can inspect all the departments and the various processes.

Every process for producing the component parts of cookers, gas fires, &c., can be seen in operation, including the heavy press work. An illustration of one of the large presses used for making cooker inside plates is shown, along with views of other departments. In the same department can be seen the machinery and presses for use in the manufacture of the meat tins and grill tins which are supplied with all "New World" cookers.

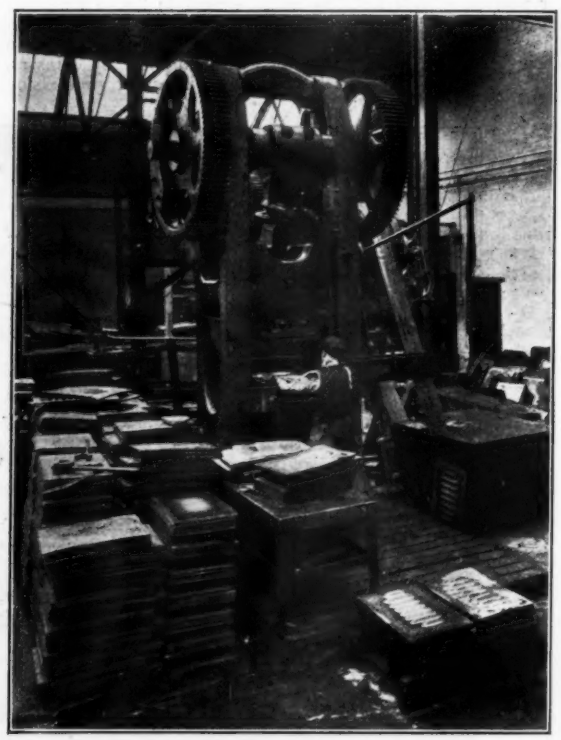
There is a very well equipped brass finishing department in which has been installed some of the latest designs of lathes for turning out brass taps and other necessary fittings, and it will also be possible to see the assembling and testing of the "Regulo" automatic oven control, which, of course, is supplied with every "New World" cooker.

No doubt every visitor will be interested in inspecting the recently-installed enamelling department, where castings for "New World" cookers, inner linings, &c., can be seen going through the various processes which result in the beautiful smooth mottled enamel surface associated with "New World" cookers.

There is also a radiant-making department where the methods of producing the "Sunbeam" radiant can be followed stage by stage.

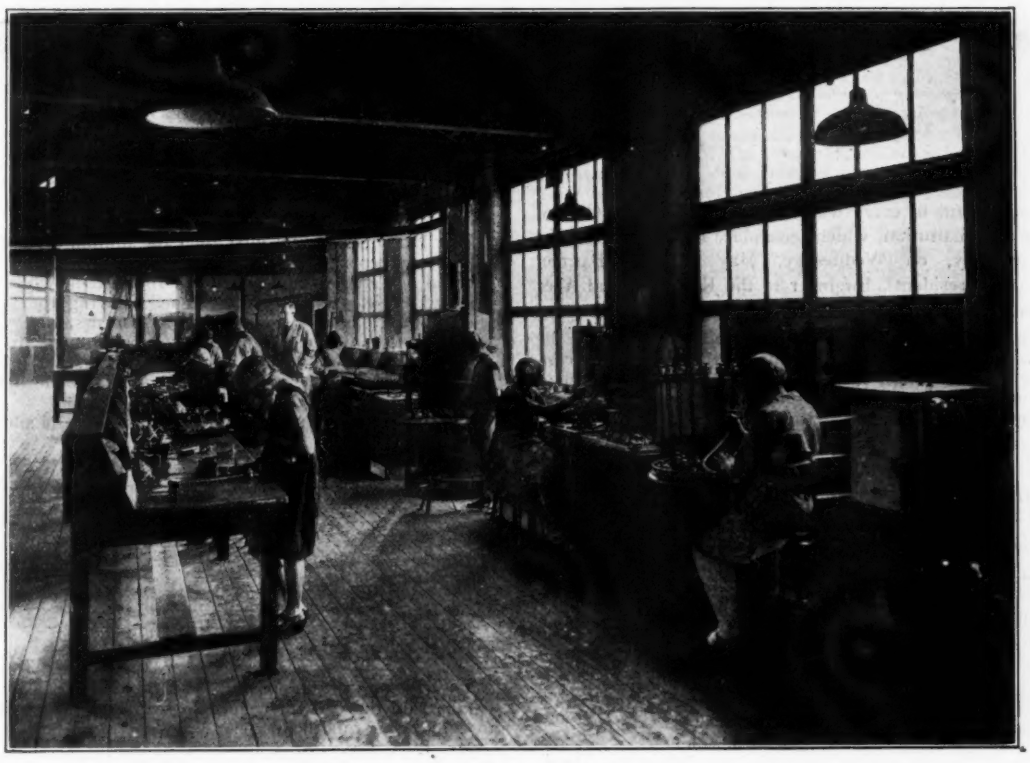
In addition, there is a department which never fails to interest and to create comment from visitors, and that is the bath enamelling department, where the baths are handled and turned about, in order to get the correct coating of enamel, as if they were small toys, and not the redhot mass of metal which one sees.

A comprehensive two or three hours can well be spent, and every facility is being offered in the way of guides to take the visitors round and make the inspection as interesting as possible.



One of the Large Presses Used for Making Cooker Inside Plates.

MAKING MEAT AND GRILL TINS.



ASSEMBLING AND TESTING THE "REGULO" AUTOMATIC OVEN HEAT CONTROL.

ENAMELLING DEPARTMENT.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.

Annual Meeting in Caerphilly.

Highly successful in every way was the twenty-fifth annual meeting of the Institution, which took place in "The Old Blue Bell," Caerphilly, on Wednesday, May 21—Mr. Barton Grainger (the President), Engineer to the Rhymney and Aber Gas Company, in the chair.

After the minutes of the last meeting had been read by the Hon. Secretary (Mr. Octavius Thomas, of Pentre), and confirmed, the following new members were added to the roll of the Institution, on the proposition of Mr. J. Stephenson, seconded by Mr. A. Rosser.

New Members.

Mr. Harry T. Gilbert, Superintendent of Distribution (Mains and Services), Cardiff Gas Company.

Mr. Leslie L. Kleist, Chemist, Cardiff Gas Company.

Mr. William T. Lane, Technical Assistant, Distribution Department, Cardiff Gas Company.

Mr. Graham A. Mogford, Engineering Assistant, Grangetown Gas-Works, Cardiff.

Mr. Henry V. Williams, Assistant to Superintendent of Distribution (Mains and Services), Cardiff Gas Company.

Presidential Address.

Mr. Barton Grainger then proceeded to deliver his Presidential Address which will be found on pp. 430-38 of last week's "Journal."

Mr. W. Clark Jackson, proposing a hearty vote of thanks to the President, said that his experiences in one of the Welsh valleys, where they knew that troubles came far too often for the peace of mind of gas engineers, were very helpful. Mention had been made by him of various joints with which his Company were experimenting, and the members would be pleased to hear at some future date the results. It was not always practical to have welded joints, though he agreed that with welded joints on steel mains one got the best joints, provided the work was well done and could be carried out on a dead main and well tested. Personally, he tested up to 20 lbs. per sq. in. before passing any joints. He (Mr. Jackson) had put down a long length of 10-in. dead steel main with welded joints; but another section he had been unable to lay in an ideal manner, as he had to keep gas going behind him all the time, and so he used long sleeve joints. This particular road was subject to heavy traffic, and there had been no foundation provided. In spite of this, there had not been a single case of trouble where the welded joints were provided; but they had had to go over practically every long sleeve joint, although these were very carefully done, and it had been specified that his own jointer should be employed by the contractors. He had expected to hear a little more with regard to coke oven gas. They knew that both the President and Mr. Prosser Jones were keen coke oven men, and they seemed to have made a very good bargain there. The feeling of some of the members was that they were happy in getting coke oven gas from the Powell Duffryn Company, who managed their plant in such a way as to give a gas of even calorific value throughout the 24 hours; and while in a case like this, provided the price was right, it was a feasible proposition, there were other instances in which difficulties kept on arising. In a certain district supplied with coke oven gas, the whole of the public lamps went out one night. There were therefore two sides to coke oven gas supply. The President's year of office had been a successful one. He had fulfilled the duties to the entire satisfaction of the members.

Mr. H. D. Madden, seconding, remarked that the President had put before them valuable information regarding that branch of the profession in which he had been able to specialize—namely, distribution in the most difficult part of the country. Some of the difficulties which he had been up against, and which he had successfully surmounted, would be a guide to those having distribution problems throughout the industry. Internal corrosion in connection with steel mains seemed to worry him somewhat. This was due to one of two things—presence of cyanogen in the gas, or sulphur compounds in the presence of moisture. If they were to look up the records of the Corrosion of Pipes Committee of the Institution of Gas Engineers, they would probably get helpful information on this matter. Personally, he never put a steel pipe down without it being covered inside with petroleum. Further, he atomized a little oil in the gas, and this, if there was any tendency to corrosion, seemed to be a preventive.

Annual Report.

The Hon. Secretary next read the annual statement of accounts and report, which stated that during the year one member and one student had joined the Institution, while one member and three students had resigned, leaving the total at the end of the year at 74 members, 4 students, and 3 honorary members. The receipts for the year amounted to £79 17s., and the payments to £80 12s. 4d., leaving, with the balance brought forward, the sum of £10 17s. 8d. in the hands of the Treasurer, with £100 in 2½ p.ct. Consols.

The report and accounts were unanimously adopted.

Election of Officers.

The following were elected officers for the ensuing year:

President.—Mr. Octavius Thomas.

Vice-President.—Mr. E. Eblett.

Members of Council.—Messrs. J. Stephenson, Owen Evans, and J. F. Rust.

Treasurer.—Mr. J. H. Canning.

Hon. Secretary.—Mr. Octavius Thomas.

Hon. Auditors.—Messrs. H. Matterface and L. W. Nuttall.

The President, proposing Mr. Thomas's election to the Chair, said they all knew him so well that there was no need to explain his qualifications.

Mr. J. H. Canning, who seconded the proposition, remarked that if any man had been responsible for the foundation, maintenance, and success of the Institution, it was Mr. Thomas. They could not sufficiently recognize all that he had done. Not only his ability, but the esteem and affection in which they all held him, made him a most desirable selection.

Institution Benevolent Fund.

It was resolved to make a donation of ten guineas to the Benevolent Fund of the Institution of Gas Engineers.

Distribution Costs as Affected by a Combined "Dri-Gas" and Naphthalene Washer.

Mr. W. Clark Jackson, of Neath, read a paper on the above subject—see later pages of this issue.

Luncheon.

A vote of thanks was accorded the Rhymney and Aber Gas Company for providing a room for the meeting and for their hospitality; and the members and friends then sat down to luncheon as their guests. As hosts, there were present Mr. John L. Morgan (Chairman of the Rhymney and Aber Valley Gas Company) and Messrs. H. H. Hann and Thomas Price. Three other members of the Board (Mr. John Thomas, Col. A. P. James, and Sir William J. Thomas, Bart.) were unfortunately unable to attend. Before rising from the tables, there were a few short speeches.

Mr. F. Richards (a Director of the Woodall-Duckham Company), in the course of his remarks, emphasized the fact that his firm have never wavered in their allegiance to the gas industry. He said that, when an opportunity presented itself to them some time ago of taking up a very fine type of coke oven in this country, they adopted this means of reducing the overhead charges of the business, and so lowering costs. With regard to the supply of coke oven gas to gas undertakings, if anyone offered them a supply at a price well below that at which they could themselves make the gas, then as good business men they would consider it; but they would have to satisfy themselves that they were adopting the right course before coming to a decision. It was purely a matter of economics. There was no right or wrong about it, except in the light of local circumstances.

The Rhymney and Aber Gas Company were toasted by Mr. R. J. Auckland, who remarked that the Board had made a great success of the undertaking, which was now the third or fourth largest in South Wales. From an output of 20 million c.ft. in quite recent times, it had gone up to 300 millions.

In reply, the Chairman said the Company were very proud that their Engineer had been elected President of the Institution. The Company had now introduced co-partnership, which was working splendidly. It had had excellent results.

Becker Coke Oven Plant at Bedwas.

In the afternoon a visit was paid to the Becker coke oven plant which has been erected for British Benzol and Coal Dis-

tillation, Ltd., at Bedwas, by the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.—who were entirely responsible for its design and construction. The party were met by Mr. D. M. Hughes, Manager of the Company, and were shown over the plant by Dr. E. W. Smith, F.I.C. (Technical Director), Mr. F. Richards and Mr. Gardner (Directors), of the Woodall-Duckham Company, and Mr. Dyson, Local Representative. The visit terminated with a hearty vote of thanks to the Company, on the proposition of the PRESIDENT, seconded by Mr. J. H. CANNING.

Later in the year, it is hoped to have an opportunity of describing in detail the bye-product coking plant at Bedwas,

which may be regarded as one of the most up-to-date installations in Great Britain.

The battery consists of thirty-five Becker cross regenerative combination ovens, heated by coke oven gas, but so arranged that with minor alterations producer gas may be used. The average capacity per oven is approximately 16½ tons, each oven chamber being 12 ft. 6 in. high and 40 ft. 8 in. long from face to face of the doors. The average width is 18 in. All parts of the ovens and regenerators which are subjected to high temperatures are constructed of silica material. The regenerator facings and oven tops are insulated, and the latter are paved with paving bricks. A concrete retaining wall about 4 ft. thick, and provided with suitable wing walls, is constructed at each end of the battery.

The coke oven gas for heating the ovens is conveyed from the holder to the battery through the fuel gas main. It divides into two 12 in. branch lines across the stack end of the battery, there being a gate valve in each branch. The volume of fuel gas used is integrated and recorded by an orifice type meter with a capacity of 250,000 c.ft. per hour. Air and waste gas reversing valves are provided for reversing air and waste gases in the regenerators. These valves are operated by an electrically-driven machine, and controlled by an electrical timing device. Reversing is thus effected automatically.

The gas is conveyed from the oven off-takes through ascension pipes to the steel gas-collecting main. Liquor flushing sprays are installed in each ascension pipe and in the collecting main at alternate ovens. A gas-pressure regulator is provided for governing the pressure in the collecting main. This regulator consists of an electrically-operated governor, which controls a butterfly valve in the off-take main.

The semi-direct method of ammonium sulphate recovery is used.

The benzole scrubbers are 90 ft. high, and are packed with wooden hurdles. The gas passes up through these towers, and is debenzolized by descending streams of wash oil.

Coal below 1⅛ in. is delivered from the colliery to a coal dry-cleaning plant of the Peale-Davis type, by a system of belt conveyors. The coal-cleaning plant has a capacity of 60 tons per hour raw coal, and consists of a primary table which produces clean coal and a primary refuse, and a re-treatment table which treats the primary refuse and produces the coal-free refuse and a coal product which passes back to the primary table. Each table consists of two decks separated by a series of air-tight compartments. The top deck which carries the bed of coal is covered with perforated sheets. The table is given a reciprocating motion. A current of air passes through the decks and through the bed of coal, causing a stratification of the coal and refuse, and is the means of the subsequent separation of the refuse from the clean coal.

The dry-cleaned coal from the Peale-Davis plant is delivered to a Carr disintegrator by belt conveyor. A fixed screen is provided to screen out a portion of the fine coal before crushing. The oversize is crushed so that 80 p.ct. of the product is less than ⅛ in. cube. A totally-enclosed bucket and link type elevator delivers the crushed cleaned coal to the cleaned coal ropeway bunker. From here the coal is delivered direct into the coke oven bin by a bi-cable aerial ropeway system. This system gives an automatic discharge of the loaded buckets at any required point at the top of the coal bin at the ovens. Provision is made for weighing both raw and cleaned coal.

The coke handling plant is arranged to give coke of the following sizes: Over 2½ in.; 2½-1½ in.; 1½-½ in.; under ½ in.

A "T.I.C." alloy bath continuous tar distillation plant is installed to treat the tar from the coke ovens. The single still of the unit is capable of distilling to pitch approximately 30 tons of crude tar per 24 hours. Fractional condensation of the still vapours is employed, and six distinct oil fractions are recovered. The still is gas fired, surplus gas from the coke ovens being used for the purpose.

GOLF COMPETITION.

On the day preceding the business, the members had their usual golf competition, which took place on the links of the Llanishen Golf Club, near Cardiff. This is an inland course of variegated character, with beautiful views of the surrounding country. The weather was good, and the course played splendidly; the event being highly successful. Mr. R. J. Auckland (who is Chairman of the Institution's golf organization) won the medal competition, with a net return of 73; his gross score of 77 being the best card returned.

The following were the best scores:

MEDAL SINGLES.

	G.	H.	N.
R. J. Auckland	77	4	73
W. C. Jackson	79	4	75
T. B. Walker	90	14	76
S. C. Whitfield	94	18	76
F. W. Richmond	83	6	77
E. S. Allen	90	11	79
J. Sadler	93	14	79
J. P. Jones	96	17	79
W. A. Richardson	101	20	81

Distribution Costs as Affected by a Combined "Dri-Gas" and Naphthalene Washer.

By W. Clark Jackson, Engineer and Manager to the Neath Gas Department.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.

Having experienced very considerable trouble during the winter of 1928-29 with water and naphthalene, I went carefully into the question of plant to deal with these, and after full investigation came to the conclusion that such considerable advantages could be obtained from an installation of a "Dri-Gas" and naphthalene plant that I had no hesitation in recommending its adoption to my Gas Committee.

The order was placed with Messrs. W. C. Holmes & Co., Ltd., for their combined drying and naphthalene plant (Patent No. 291,832, 1927), and the plant put to work on May 6, 1929.

The plant consists of two special mechanical rotary brush type washers, in the first of which moisture which is always present in coal gas is removed, and in the second naphthalene which is also present in the gas is removed.

Dealing first with the elimination of moisture, it is necessary to consider first of all the harm which moisture actually causes. This can be best set out under the following heads:

(*a*) Internal corrosion of mains with consequent rapid depreciation in their life, and consequent reduction in the carrying capacity for gas in the mains themselves.
(*b*) Internal corrosion of services with the same consequent results.
(*c*) Internal corrosion of meters, with consequent shortage of meter life.
(*d*) Condensation in mains and consumers' services, with consequent necessity for pumping this condensed water out at regular intervals.
(*e*) Internal corrosion of the gasholders at the works, which reduces the life of the holder, and as this corrosion takes place out of sight there is a liability of the corrosion carrying on to such an extent without being found out as to cause a serious danger of collapse.

Dealing with the second point—naphthalene removal—I need hardly point out the bugbear this is to the gas industry and the great advantages to be obtained by its removal at the works. The advantages of the machine in drying gas and removing naphthalene are, therefore, as follows:

(1) Prevention of rust in mains and services with considerable reduction in the annual charges for replacement of these.
(2) Reduction in the cost of meter repairs owing to the ideal conditions under which they will be working.
(3) Reduction in the cost of syphon pumping and the trouble of disposing of this liquor pumped from the syphons.
(4) Mains and services which are partly waterlogged will be dried out, and thereby resume their original carrying capacity.
(5) Mains and services containing naphthalene will have this re-absorbed by the gas.
(6) Leakages of gas will be more easily traced, as the presence of water in either mains or services would indicate leakage or fracture.
(7) The interior of the gasholders will be free from corrosion.
(8) The cost of labour for removing water and naphthalene stoppages will be entirely eliminated.
(9) A greatly improved service will be given to the consumer, as there would be no stoppage in the supply due to condensed water or naphthalene.

I estimated that it would be possible to effect an annual saving in respect of repairs to mains and services account of a figure round about £500 to £600, and that, in addition, the Department would be able to guarantee an absolutely uninterrupted supply to the whole of its gas consumers, a factor which cannot be put into monetary terms, but which has an enormous effect upon the Department's business stability.

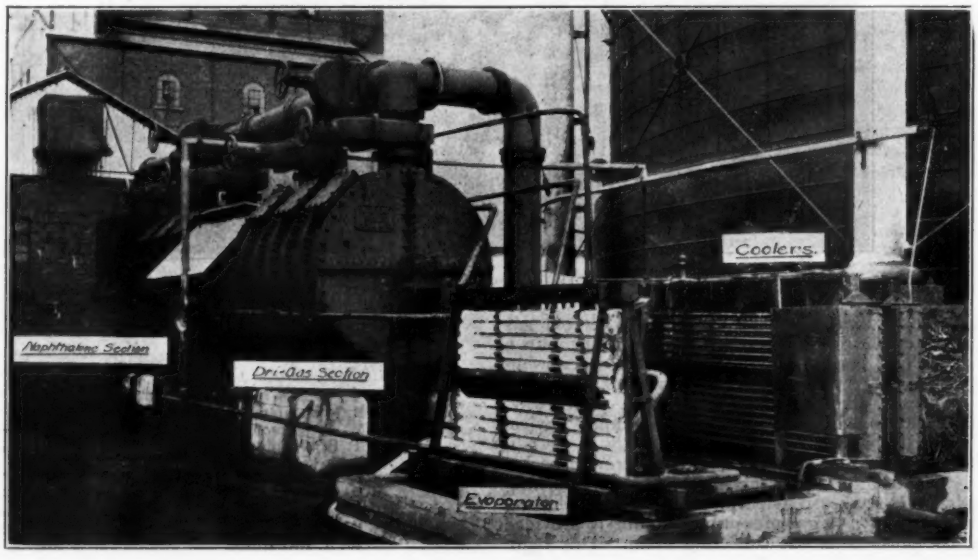
I have had no cause to regret my decision, as the plant has given admirable service, and the savings effected have more than reached my original estimate.

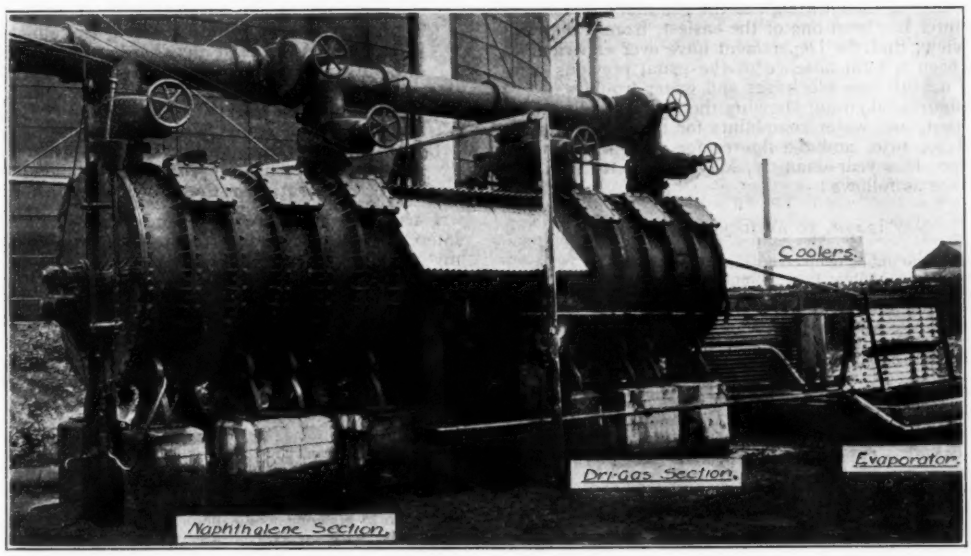
After deciding to instal this plant, the first question that naturally arose was as to where the plant should be fixed, and after very careful consideration I eventually decided to have the plant fixed at the inlet to the station meter. The meter being of the "Connersville" dry type made this much easier. This meant that each of the gasholders in use had to be filmed over with a special grade of oil, so as to obviate the gas picking up moisture again in the holders, which would have happened had no oil film been interposed between the water contained in the tank and the gas. At the same time, putting the plant in this position enabled a smaller plant to be used than would otherwise have been the case had it been fixed at the outlet of the holder, when the plant would have required to be equal to the maximum hourly demand upon the district—a very different thing from the maximum hourly make at the works.

On a plant of this description the "Dri-Gas" section is fixed first in the line of gas from the purifiers, the gas passing through from this section to the naphthalene section on its way to the meter; by working in this manner the efficiency of the naphthalene extraction is greatly increased as there is no water to deposit in the gas wash-oil, the moisture having been previously removed in the "Dri-Gas" section.

Most of you are well acquainted with the working of an ordinary naphthalene washer, which calls for no special mention here, excepting to say that there should always be a continuous spot test on the outlet, and regular daily supervision of the quantity of oil put in and the quantity of oil withdrawn from the washer, together with a check test at least once per week on the gas at outlet of holders.

The "Dri-Gas" section, as fitted at Neath, consists of the usual standard rotary brush scrubber, underground storage tank for the calcium solution, water-sprayed cooler for cooling





down the calcium solution, and a steam-heated evaporator for evaporating off the moisture taken from the gas by the calcium solution, which if left in would gradually weaken the solution down to below its working concentration for efficient extraction of moisture; an ordinary single-acting ram pump to circulate the calcium solution through the cooler and washer, driven from the horizontal engine as commonly used on these rotary type washer scrubbers. In passing, I might say that it is the steam from the exhaust of this engine which gives the necessary heat to the evaporator for evaporating off the surplus moisture.

In the Holmes' " Dri-Gas " plant calcium chloride solution is the medium utilized for the extraction of moisture from the gas, and this solution is maintained as near as possible to 78° Twaddell during the summer working and 72° Twaddell during the winter. The pump circulates the calcium chloride solution through the washer; this calcium solution, being hygroscopic, absorbs moisture from the gas, and the solution leaves the washer at a slightly higher temperature and less concentrated, the moisture taken out of the gas weakening the solution, and the heat given out in this process raising the temperature of the solution.

The solution overflows to the underground tank and is here picked up again by the pump which circulates the solution through the cooler on its way to the washer. At the inlet to the washer a special tun-dish box is fitted with an overflow section, and part of the solution overflows from this tun-dish and is led by means of a pipe to the evaporator, where the surplus moisture is evaporated. A concentrated solution is thereby obtained which gravitates from the evaporator down to the underground tank, and enables the bulk solution to be maintained at the required Twaddell.

The plant is in charge of the Works Chemist, as part of his duties, and is examined twice daily by him in the ordinary routine to see that conditions are kept normal.

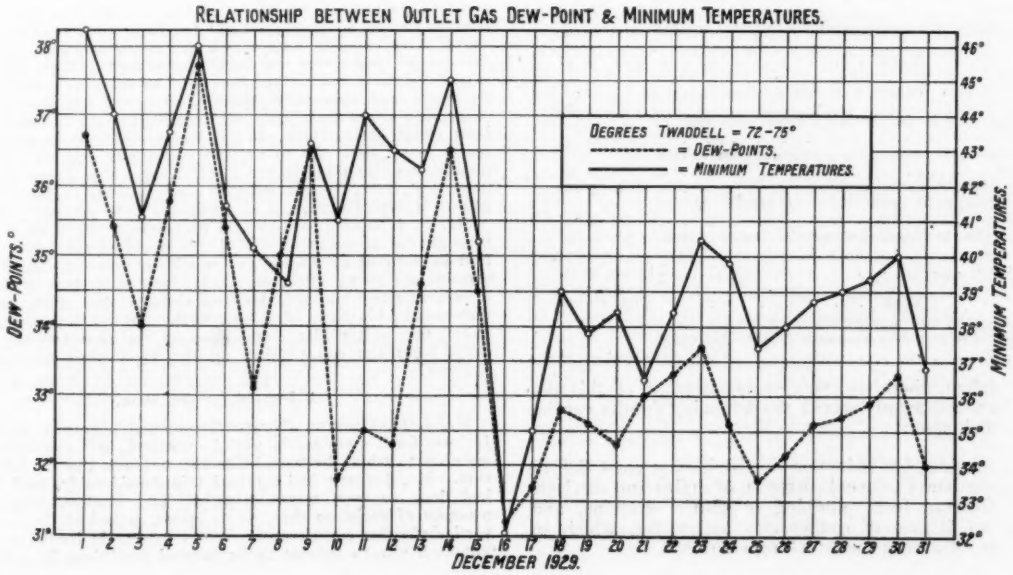
The average results obtained work out as follows:

—	Summer Working.	Winter.
Inlet gas temperature	65°	52°
Inlet gas dew-point	61·6°	50·8°
Outlet gas temperature	63°	50°
Outlet gas dew-point	44·7°	32°
Outlet from holder dew-point	44·8°	32·5°
Temperature of atmosphere during the 24 hours:		
Minimum	54°	40·3°
Maximum	74°	48·0°

It will be observed that the dew-point of the gas is well below the minimum atmospheric temperature, and it is therefore impossible for any moisture to be condensed out on the distribution system.

Graphs are made out each month, and a typical graph for last December is submitted for inspection. This shows the relationship as between the dew-point and the minimum atmospheric temperatures.

The plant was put to work at the beginning of May, 1929, and by the middle of June district conditions with regard to both naphthalene and water troubles began to show considerable improvement. By the end of July water troubles had practically vanished, and naphthalene troubles were clear so far as the centre of the town was concerned, and were only showing on the outskirts. By the end of September all signs of naphthalene throughout the district mains and service pipes had disappeared, and no trouble from water was experienced, excepting at about six different places where, upon investigation, it was found that the water trouble was due to defective joints


RELATIONSHIP BETWEEN OUTLET GAS DEW-POINT & MINIMUM TEMPERATURES.
DEGREES TWADDELL = 72-75°
---------- = DEW-POINTS.
———— = MINIMUM TEMPERATURES.
DEW-POINTS.°
MINIMUM TEMPERATURES.
38° 37° 36° 35° 34° 33° 32° 31°
45° 44° 43° 42° 41° 40° 39° 38° 37° 36° 35° 34° 33° 32°
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
DECEMBER 1929.

on the gas main itself or defective service pipes, which were allowing the water to filter through to the gas main.

The past winter has been one of the easiest, from a distribution point of view, that the Department have ever experienced, there having been a total absence of the usual previous complaints due to naphthalene blockages and water troubles.

I have had figures taken out showing the cost of dealing with naphthalene, rust, and water complaints for the period May 1, 1929, to April 30, 1930, and the figures for the corresponding period of the previous year—namely, May 1, 1928, to April 30, 1929. These are as follows:

May 1, 1928, to April 30, 1929.

	£	s.	d.
Cost of attending to public lamp complaints due to rust	41	13	6
Cost of attending to public lamp complaints due to naphthalene	35	17	4
Cost of attending to district syphons	50	17	4
Cost of attending to consumers' complaints found to be due to water condensation	204	0	0
Cost of attending to consumers' complaints found to be due to rust	321	4	0
Cost of attending to consumers' complaints found to be due to naphthalene	334	18	0
Total cost of attending to pumping of district syphons, and attending to consumers' complaints due to naphthalene, water, and rust, and public lamps	£988	10	2

May 1, 1929, to April 30, 1930.

	£	s.	d.
Cost of attending to public lamp complaints due to naphthalene	15	12	0
Cost of attending to public lamp complaints due to rust	4	14	0
,, ,, district syphons	9	19	6
,, ,, consumers' complaints due to naphthalene	21	5	0
Cost of attending to consumers' complaints due to rust	161	0	9
Total cost this year	£212	11	3

The saving in cost for the year May 1, 1929, to April 30, 1930, as compared with the year May 1, 1928, to April 30, 1929, is, therefore, £775 18s. 11d. From this has to be deducted the cost of working the "Dri-Gas" and naphthalene plants as follows:

	£	s.	d.
"Dri-Gas" plant: Capital charges (loan repayment and interest), wages, steam, oil, &c.	91	15	2
Naphthalene plant: Capital charges (loan repayment and interest), wages, steam, handling of oil, &c.	82	15	0
Total	£174	10	2

making a net saving for the first twelve months of £601 8s. 9d.

I expect this saving, however, to be considerably increased during this next twelve months, as it took several months of the plant in use before the naphthalene and water which were lying in the district mains and services were cleared out.

As some guide, I submit figures relating to the months of March and April of this year with the plant working under normal conditions, and figures relating to March and April, 1929, prior to the plant being put into operation.

March and April, 1930.

	£	s.	d.
Cost of attending to public lamp complaints due to naphthalene	0	5	0
Cost of attending to public lamp complaints due to rust	0	18	9
,, ,, district syphons	0	0	0
,, ,, consumers' complaints due to naphthalene	0	0	0
Cost of attending to consumers' complaints due to rust	17	0	9
Total	£18	3	6

March and April, 1929.

	£	s.	d.
Cost of attending to public lamp complaints due to naphthalene	6	10	4
Cost of attending to public lamp complaints due to rust and water	7	11	6
Cost of attending to district syphons	9	4	10
Cost of attending to consumers' complaints due to naphthalene	60	18	0
Cost of attending to consumers' complaints due to rust	58	8	0
,, ,, ,, ,, ,, water condensation	24	0	0
Total	£166	12	8
Saving during the two months March and April, 1930, as compared with the two months March and April, 1929	£148	9	2

It can be taken, therefore, that where a plant of this description is installed at any works the following results can be confidently anticipated:

(*a*) A very considerable reduction in distribution costs due to the prevention of internal corrosion of mains and services.
(*b*) Entire freedom from pumping of district syphons, and having to dispose of condensates and water, which so often are of a very foul-smelling character.
(*c*) An ability to guarantee to consumers an uninterrupted supply of gas at all times.
(*d*) A much greater ease in locating leakages of gas, as any water found to exist anywhere on the distribution system points at once to a leakage of gas in the immediate vicinity of the water.
(*e*) A reduction in the cost of upkeep and repairs of meters.
(*f*) Longer life of service pipes and mains.
(*g*) Much fewer road openings by the Gas Undertaking—a matter very much appreciated by the engineering staff of any Corporation in these days of intensive road traffic.

I trust these few remarks and figures may stimulate your interest in this modern adjunct to gas-works plant, as I feel my own works have benefited tremendously by its use—not only in the actual monetary savings effected, but, much more important still, in the additional confidence being reposed in the Gas Department by the public, on account of the removal of these three old troubles, water, naphthalene, and rust, which used to interfere so frequently with the gas supply. This confidence is reflected in the additional business turnover being obtained even in these days of trade depression.

Discussion.

Mr. F. Boardman (Cardiff) inquired whether there was any loss of calcium solution during the working of the plant.

Mr. J. E. Kenshole (Merthyr) asked if the author had made any alteration to his condensing plant since he had had these big troubles. Obviously, with an expenditure consequent upon them running into £988 10s. a year, something had to be done, and no doubt he was perfectly justified in putting down this plant; but there was the possibility that, if he had made any alteration to the condensing apparatus, some part of the saving should be credited to that. He had been struck by the very large number of stoppages there must have been from naphthalene. With vertical retorts, he had always understood that naphthalene troubles were practically overcome, but in this case it did not appear to have been so. Personally he worked at fairly high temperatures, with horizontal retorts. He had experienced some little naphthalene difficulties, but adopted oil washing with a Livesey washer, which had given him considerable relief. The expenditure given in the paper for March and April, 1930, £18 3s. 6d., was about 80 p.ct. more than it had cost him, with a works very much the same size. Had Mr. Jackson altogether given up draining the syphons?

Mr. J. Stephenson (Aberdare) remarked that in considering the possibility of installing such a plant, each one must take into account his own particular circumstances. Undoubtedly Mr. Jackson had gained much relief. What he would like to know was just what the author included in his cost of £988. Was it mainly wages, or did it include materials, re-instatement, and so on? Was it a paper saving or an actual saving?

The Corrosion Problem.

Mr. H. D. Madden (Cardiff) said he was in entire agreement with all the principles enunciated by the author in regard to the advantages of the dry gas combination. He, too, had always understood that verticals did away with naphthalene. Did the author get the naphthalene from the verticals or from water gas? It was peculiar he should have been so troubled throughout those years. Another point by which he had been struck was in connection with repairs to pipes. It must be assumed that the Neath undertaking had been sending out wet gas from its inception, and that the mains and services were corroded. Of course, the drying of the gas would not cure these service pipes, and make them whole, so that there must be a large amount of work to be done in renewing services that had been corroded in past years. How did the author manage to keep the oil film in the gasholders when the holder was cupping and uncupping continuously, as happened in these days of peak load cooking?

Mr. C. Cooper (Mesrs. W. C. Holmes & Co.) said he had great admiration for Mr. Jackson's paper, largely because of the simple and straightforward manner in which he had presented it, and also because he had so clearly set out the theoretical reasons why things should have come to pass which had come to pass. Most of them thought of gasholders as fairly permanent things, and they did actually give very little trouble; but as showing what water could do when conditions were suitable, he might say that he had seen a member taken from a holder trussing in the Tropics. This had been about $\frac{1}{16}$ in. thick, and it had practically disappeared during seven years' life. As to vertical retort gas and the occurrence of naphthalene, he thought the general experience of recent years had been that, even in this case, it was unusual to have less than 4 grains of naphthalene, and it did appear to be necessary to remove it.

Mr. B. J. Bell (Cardiff) said that among the savings anticipated through the adoption of the plant, Mr. Jackson included a reduction in the cost of upkeep and repairs of meters. Some gas had a certain lubricating effect on the leathers of meters, which acted as a preservative; but Mr. Jackson claimed that there would be no moisture in his gas. Had he actually opened any meters since the installation of the plant, and if so had he observed any deleterious effect from the gas picking up the lubricating medium in these leathers?

A Legacy of the War.

Mr. J. H. Canning (Newport) proposed a vote of thanks to Mr. Jackson for his eminently useful, practical, and topical paper. One question to which he would like to refer was that of internal corrosion. Mr. Jackson had stressed this considerably, and Mr. Cooper had done so even more strongly. Mr. Madden said it was the presence of moisture that, so to speak, unlocked the corrosive properties of other constituents. Water vapour in itself, in his opinion, although always present under normal conditions in a water sealed

holder, was not capable unaided of doing the mischief often attributed to it. Within the last five years he had opened, examined, and overhauled some holders of very considerable age, and to his astonishment they were in practically as good a condition internally as when the makers left them. The only corrosion discovered was external on the water level in the lute. He rather doubted whether, in all cases, there would be the saving upon internal corrosion which Mr. Jackson calculated. Personally, he was inclined to think that a good deal of the corrosion from which they were suffering to-day was a legacy of the war, and that in part the same remark applied also to naphthalene. The gas was at that time not of the quality they would have wished. They were working under difficulties, and accumulated trouble which had forced itself upon many of them during the years that had followed. Naphthalene in particular was very elusive, and in his own case he experienced very great difficulty from it at the end of the war. Sometimes they thought they had got rid of it, and then it would re-appear in as strong a form as ever. It found lurking places, and when appropriate conditions of temperature arose it had a way of coming to life again and depositing itself in the most extraordinary positions. He rather felt that Mr. Jackson would obtain the full benefits of the plant he had installed when, in the course of time, with the renewal of mains and services, he had put the whole of his distribution system in a thoroughly good condition. What was the thickness of the oil film, and how was it introduced into the holder? To him, it seemed that the greatest advantage of a plant of this kind was the last one stated by Mr. Jackson—improved service to the consumer. This was at the present time the most vital thing to all of them. Nothing annoyed a consumer more than an interruption to the supply; and the trouble was that naphthalene had the peculiarity of seeking out the best consumers, for the obvious reason that the deposition of naphthalene in a pipe was proportional, other things being equal, to the quantity of gas passing through that pipe.

Mr. R. J. AUCKLAND (Cardiff) seconded the vote of thanks, and congratulated the author upon the excellent discussion to which his paper had given rise.

QUESTIONS ANSWERED.

Mr. JACKSON, in the course of his reply, said that there was a loss of the calcium solution; but the cost of making this good and keeping the whole thing working under proper conditions had been included in his list of charges. He had made alterations to his condensing plant, and had no doubt that the more adequate condensing had contributed to the better results with regard to naphthalene. The plant he had described enabled him to drive out the rust existing in the service pipes, because it was now perfectly dry. The old mains at Neath were laid very shallow, so that they were greatly subject to temperature conditions. He agreed that with verticals one did not get the same trouble from naphthalene as with horizontals. For a long period, when he had ample plant without bringing his carburetted water gas apparatus into operation at all, he experienced very little trouble; but when he had to help the output with carburetted water gas, the naphthalene complaints went up rapidly. He inspected his syphons once every six weeks, so as to keep a record. The saving of close upon £1000 which he had shown in his paper was a true saving. They had dispensed with the services of half-a-dozen men, who had now been put on to the profitable job of hunting for leakages. For a number of years past his undertaking had suffered from a high percentage of unaccounted-for gas, which had now been brought down from 23 p.ct. to the region of 11 p.ct. He was hoping in course of time to get down much below this figure, which was already a very great improvement. He had so far experienced no difficulty with the oil film, and it was over a year since the holders were filmed. He had specifically refrained from putting in anything for meters. This matter was being closely watched, and it was found in those that had been opened up that the lubricating oil was now in better condition than in the old days. It was, however, impossible to say much about this after a year's working. He had fewer meters put out for test at present than for a number of years past, but this might be accounted for in many ways. The holders had been filmed so that the gas should at no time come in contact with water, and the thickness of the oil film was ⅜ in.

Electrical Fusion of Gas Pipes.

A Meeting of the Manchester District Institution of Gas Engineers and Managers was held on May 16 at the Midland Hotel, Manchester—Mr. W. J. SMITH, B.Sc. (Bolton), presiding.

NEW MEMBERS.

The following gentlemen were inducted as new members of the Institution: Mr. John H. Chew, F.C.S., Engineer and Manager, Gas Department, Blackpool; Mr. Thomas Rowell Cook, Engineer and General Manager, Gas Department, Rotherham; and Lt.-Col. John Kennington, Engineer and Manager, Gas Company, Great Grimsby.

MR. SAMUEL GLOVER.

The PRESIDENT announced that Mr. Samuel Glover, who has been suffering from a severe illness, was now reported to be well on the way towards recovery; and it was unanimously resolved that the Hon. Secretary (Mr. J. Bridge, Elland) write a letter to Mr. Glover congratulating him upon the improvement in his health.

MR. WIDLAKE LECTURES.

Mr. H. C. WIDLAKE, A.M.I.E.E., Chartered Electrical Engineer, of the Plymouth and Stonehouse Gas Light and Coke Company, then delivered a lecture upon the electrical fusion of gas pipes, a subject to which the attention of gas engineers generally is becoming somewhat seriously directed. Mr. Widlake stated that when an electrical fault was responsible for the puncturing of a gas conduit, and the subsequent ignition of the escaping gas, it did not occur to the public generally to attach the responsibility for the mishap to the electric current, but rather to blame the gas for the ensuing damage.

There was no doubt that, under certain conditions, the dual use of gas and electricity by the same household might result in the creation of a dangerous state of affairs, and it was equally certain that, if gasfitters were trained to identify those conditions, much would be done to eliminate the risk of fire. The vague order which warned gasfitters against allowing gas pipes and electrical conduits to touch each other, and instructed them to fit spacing pieces of insulating material, was all right as far as it went, but it was desirable that it should be supplemented by knowledge on the fitters' part as to what constituted a dangerous state of affairs.

Mr. Widlake then cited a typical case of electric fusion of a gas pipe.

An engineer is advised of a leak in a certain house in which a fire may, or may not, have occurred. Upon investigation it is found that an iron or compo pipe lying in close proximity to a lead sheathed cable or an electric conduit has been perforated, the appearance of the pipe suggesting the application of an acetylene torch. A corresponding perforation is generally noted on the adjacent lead sheathed cable or conduit, and it is obvious that the two services have been in contact and that a heavy current has passed across the point of such contact. The obvious step to take is to restore the gas service by replacing the damaged pipe, but it then becomes necessary to investigate the conditions which make it possible for a short-circuiting electric current to seek a path to earth via the gas service.

Continuing his lecture, Mr. Widlake stressed the point that the form of trouble mentioned in the cited case had nothing to do with electrolysis. Electrolytic action was a slow and gradual process which resulted in the wasting and ultimate destruction of the pipe. It was fairly prevalent in the case of street gas and water mains in towns where an electric tramway system was used, and was caused by the return current (the whole of which should flow through the tram rails) seeking a parallel path via the adjacent mains on its way back to its source of supply.

The fusion of gas pipes by electricity, however, occurred practically instantaneously, and was only possible where the electrical installation was either of inferior character or had been allowed to lapse into a dangerous condition. Due to one or other of these factors, a short-circuit seeking the easiest path to earth found that path via the gas pipe instead of by a legitimate route which should have been provided as part of the installation.

The lecturer then explained in detail the customary methods employed in the wiring of buildings for electrical purposes, and mentioned that a metallic protecting sheathing used for enclosing an electrical conductor was liable to become "alive" in the event of the conductor insulation becoming damaged or perished. It was, therefore, necessary that such a sheathing system should be electrically continuous throughout its ramifications, and that it should be connected to earth in an effective manner so that an easy path to earth might be provided for any current with which the sheathing might become charged.

The ideal conditions for a dwelling house and the safety of its occupants were: (*a*) The conduits or metallic sheathing in which wires were enclosed should be electrically continuous throughout the entire system, and maintained in that condition; (*b*) the conduits should be in good contact with the general mass of earth, and maintained in that condition; (*c*) the conduits and gas pipes should be so spaced as to make it impossible for them ever to touch each other.

The duties of house fitters and service men could be very clearly defined. In putting in new work or altering pipes in premises where there was an existing supply of electricity, any gas pipe should be so run as to maintain a distance of at least 2 in. between the pipe, electrical conduit, or wire beside which it might run or which it might cross. Where there was a possibility of either a conduit or a gas pipe bridging this space of 2 in. by sagging, a spacing piece of hard dry wood must be rigidly fitted. When it was impossible to maintain this distance, the circumstance should be immediately reported to the inspector in charge. Also, when in the course of his work an employee noticed, or had reason to believe, that an electric wire or conduit was either touching or in close proximity (less than 2 in.) to a gas pipe, or was, by possible sagging, likely to touch a gas pipe, the circumstance should be reported at once.

The risk of damage to gas pipes by electrical fusion varied considerably according to the precise nature of the contact between the pipes and the cable conduits, and in steel-framed buildings it might become a matter of difficulty to prevent metallic connection between the two services.

A practical demonstration of the various points referred to in the lecture was given by Mr. Widlake by means of a working model of two houses connected to a 12 volt accumulator and so wired as to permit of a demonstration of any fault, or combination of faults, which would result in a short circuit current flowing to earth via either the legitimate earthing connection or through the gas meter and gas service pipe. Provision was made for bringing a lead-covered cable into contact with a gas pipe, and coloured lights indicated the path of the return current to earth.

Discussion.

Mr. E. J. Wellens (Wombwell) said he had had the experience recently of a tramway system passing through a town. A trolley arm came away from the live wire, and by coming away brought down the live wire which came in contact with the tramway standard which had a gas lamp bracket attached to it. The wire smashed the lamp, and the current travelled down through the service pipe, through a 4-in. main for a distance of 100 yards, and then passed along a side street for another 100 yards, making contact at a house in the street. Thereafter the current pursued a somewhat tortuous course through the house, with the result that a gas pipe came in contact with a "live" water pipe and fused. Fortunately, the heat from the fused gas pipe also melted the water pipe, and the outflow of water put out the fire. The humorous part of the whole occurrence was that the gas supply undertaking had received a bill to the amount of £20 for the repair of the damage to the property, the whole of the blame for which was attributed to an escape of gas. In the case of towns where the main streets were lit by means of lamps attached to trolley standards, apparently there was considerable risk of trouble arising which had not as yet been generally contemplated. Actual personal contact with "live" wires could not be by any means regarded as a pleasant experience. At one works with which he had been connected he came in contact with a 3-phase power system. The contact took place over a period of 1½ minutes and his eventual recovery was mainly due to the application of artificial respiration. A fitter who had a similar experience was fatally electrocuted instantly.

Mr. Widlake doubted very much whether the owner of the property damaged could maintain his claim for compensation against the gas supply undertaking.

Mr. Wellens said that the claimant had been referred to the tramways undertaking and that they had denied all liability.

Mr. Widlake observed that it would be establishing a very dangerous precedent for a gas supplying authority to admit the validity of any such claim. There would not necessarily be any greater guarantee of safety if a gas lamp was placed elsewhere than on a tramway standard, because if the overhead wire broke it fell in a snake-like manner and it was utterly impossible to predict where it would fall or what it would touch. If gas lamps were placed anywhere within radial striking distance of a falling tramway wire there was always a fair chance of contact being made. There was an instantaneous rush of current which raised the potential of all gas and water pipes in the vicinity and flash-overs must occur.

Earthing on to Water Pipes.

Mr. J. R. Bradshaw (West Hartlepool) said that a portion of his official responsibility included the management of a water undertaking. In his districts electricians had always been permitted to earth their wires to water pipes. Until recently no very great trouble had ensued, but within the last three or four years a new housing scheme had been in course of completion, and it was found that a number of copper water pipes were beginning to show early signs of corrosion. In every case where this corrosion had taken place there had been an earthing of an electrical system to the water pipe. Water companies had been very tolerant in such matters in the past because very little of the expense, if any, for any resultant damage had been met by them. If the possibility of damage in this direction became serious, then water companies would have no alternative except to insist that no electrical system should be earthed to their pipes. In the particular district where corrosion took place the current was A.C., but in other districts D.C. was used.

Mr. Widlake said the fact that the current was A.C. would seem to eliminate the lighting supply from responsibility. The risks of electrolysis from A.C. were fractional as compared with those from D.C.

Mr. Bradshaw said that electrolysis took place over a continuous length of 6 ft. of piping. In regard to an estate of 80 houses there had been seven cases of rapid deterioration of copper piping. Half the number of houses had been fitted with cheap Belgian copper pipes, and it was in those cases that the corrosion had taken place. In other cases where British copper of heavier section had been used there had been no corrosion.

Mr. Widlake said that an authority supplying A.C. usually kept their cables in a far better condition than was necessary for D.C., because the personal risks and the puncturing effect, voltage for voltage, were much greater. Personally, he should suspect the street tramway system as being the offender.

Mr. Bradshaw said that the system was of the trackless type.

Mr. Widlake thought, if that was so, it would rather seem to exonerate the tramway system from blame also. He would suggest exploring the houses, and the houses in the immediate neighbourhood, by means of a sensitive voltmeter at times of maximum load both for lighting and for tramway power purposes. The investigation should be made between the copper piping and the sheathing of the conduit, to ascertain whether there were two points between which there was a definite difference of potential.

Answering Mr. F. V. Barnes (Todmorden), the lecturer stated he was of opinion that gas suppliers should not undertake the responsibility of testing for electrical leakages; it would throw a very unfair burden on the gas industry.

Mr. J. H. Clegg (Burnley) said that in the case of the works with which he was connected, there was a hot feed-water system in operation which had been subject to spot pitting throughout a rather heavy section of 3-in. pipe. The water engineer would not admit that it was due to the quality of the water which was slightly acidic and contained an excess of oxygen and CO_2. The water engineer attributed the damage to electrolysis. D.C. was supplied, and tests demonstrated there was no leakage of any importance. The hot feed-water system was connected from a concrete tank, and after the water had been preheated it passed underground to the various boilers in the works. In the event of electrolysis occurring, would it be on the inside of the pipe or external? The pitting noticed was on the inside of the pipe. There was no telpherage system at the works to account for leakage, but the pipe in question was close to an electrically-operated hoist.

Mr. Widlake thought that dissolved oxygen was the probable cause of the trouble. Personally, he should expect the pitting to be on the outside of the pipe in the case of electrolysis, and very likely it would not be localized, but would be present generally where the pipe came into contact with some other metal. In the case of a D.C. system the wastage always took place at the point where the current left the pipe.

Lead-Sheathed Cables.

Mr. F. G. Shaw (Buxton) said there was always a possibility of trouble arising where extensions had been made of lead-sheathed cables. Lead sheathing was exceedingly popular, being cheap and easy to work. There had been two cases of rather dangerous fires in his district, and it was somewhat remarkable that in both cases there had been extensions to the lead conduit system.

Mr. Widlake said that in cases of extension there should be tests not only for insulation value but also for continuous earthing.

Mr. Shaw mentioned that extensions to lead-covered cables were being made all over the country, without any authority for them being obtained from the local electrical engineers.

Mr. Widlake replied that two points should always be borne in mind—the electrical continuity of the sheathing and of the earth wires. Fusion could not occur if a conduit through which a cable was run was metallically continuous throughout its whole length and was finally properly earthed.

Mr. G. F. Twigg (Castleford) inquired whether, in the case of cables used on an A.C. circuit, any transformer action might occur if a cable was run alongside a gas or water pipe and heat generated.

Mr. Widlake replied that in the case of A.C. lighting supply twin wires were always used. Transformer action did take place between the two wires, or, in other words, the interaction due to transformer effect took place between the two wires, and was confined to the wires. This did not affect the conduit so long as twin wires were used in the conduit. The point would arise if a single wire was lying either singly or else cheek by jowl with a pipe.

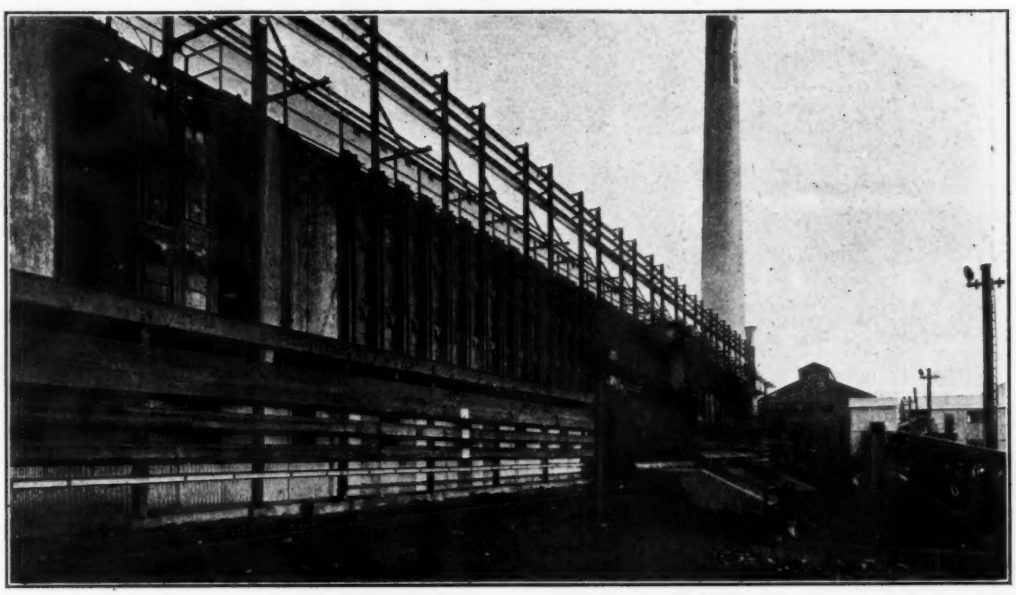
Mr. W. M. Carr (Stretford) proposed that a most hearty vote of thanks be accorded to Mr. Widlake for his highly interesting and instructive lecture which had provoked one of the best discussions the Institution had had for a long time. Personally, he had been able to learn a great deal with regard to the technique of house wiring from the lecture. In the past, gas engineers had been somewhat prone to imagine that electrical dangers from their point of view were restricted to what might happen in the street. The points dealt with by Mr. Widlake appeared to indicate that there was necessity for legislative action in connection with electrical installations for housing purposes, and that electrical undertakers should be compelled to test every fitting and every piece of wiring used in either a new installation or added to an existing one. As had been pointed out by Mr. Widlake, the Press always ascribed the origin of a fire to the ignition of escaping gas; it never occurred to them that the real culprit was an escaping electrical current. The whole subject matter of the lecture indicated the necessity for closer co-operation between the gas and electrical engineers of public utility undertakings. In some cases electrical installations were earthed to the gas pipes of houses, which was an extremely dangerous practice.

Mr. W. B. McLusky (Halifax) seconded the vote of thanks, which was carried unanimously by acclamation.

XUM

Becker Coke Oven Plant at the Smithywood Works of Thorncliffe Coal Distillation, Ltd., Sheffield.

The new bye-product coking plant recently installed at the Smithywood Works of Thorncliffe Coal Distillation, Ltd., at Sheffield, is one of the largest and most up-to-date installations in Great Britain. It has a carbonizing capacity of 1200 tons of coal per day. Modern coking practice has developed in the direction of increased output from ovens of larger capacity. This has necessitated the development of improved methods of heat distribution, the introduction of silica material capable of withstanding high temperatures, and the employment of a stronger form of construction throughout. The Becker design of oven, as installed at Smithywood, fulfils all these requirements, and ensures ease of operation.



COKE SIDE OF BATTERY, SHOWING COKE WHARF.

The Thorncliffe installation was the second battery of Becker ovens to be put into operation in Great Britain, but a third is now in full operation at the Bedwas Works of the British Benzol and Coal Distribution, Ltd. Since its introduction in 1923, the Becker oven has met with world wide success. Plants are now in operation or building in various parts of the world with a total annual carbonizing capacity of over 36 million tons. Of the 4788 Becker ovens built, 20 p.ct. are fired by producer gas, 8 p.ct. by blast furnace gas, and the remainder by coke oven gas. There are now 21 European plants with an annual carbonizing capacity of 7 million tons of coal.

The Thorncliffe installation was put to work in September, 1929, and is now producing each week approximately

5,800 tons of coke,
97 tons of ammonium sulphate,
68,000 gallons of tar,
29,600 gallons of crude benzole,

and is supplying 28 million c.ft. of debenzolized gas to the Sheffield Gas Company, with an average calorific value of 538 B.Th.U. per c.ft.

The Oven Battery.

The battery consists of 59 Becker regenerative ovens, normally heated with coke oven gas. The design also permits of operation with clean producer gas, after minor exterior changes of gas piping connections, &c., have been made. The ovens are 40 ft. 8 in. long from face to face of the doors; they are 12 ft. 6 in. high, and the average width is 16 in. The coal capacity per oven is approximately 15 tons wet coal or 13·50 tons dry coal. With the exception of the regenerator bottom liners and fillings and the end walls adjacent to the reinforced concrete pinion walls, the remainder of the oven brickwork, from the pad upwards, is constructed of first quality silica. The oven tops are insulated and are paved with paving bricks. The oven jambs and regenerator facings are also insulated. Concrete retaining walls, some 4 ft. thick provided with suitable wing walls are constructed at each end of the battery. A firebrick-lined concrete waste-gas flue is built on each side of the battery. The oven stack is 250 ft. high and is firebrick-lined for the first 50 ft.

Oven Charging.

A coal-charging car consisting of four steel hoppers with a total capacity of approximately 15 tons runs along the top of the battery. Each hopper has an adjustable measuring device. It also has a cast-iron drop sleeve for directing the coal into the ovens, which is operated by a lever interlocked with the traction motor. This makes it impossible to move the car with the sleeves down. Four charging holes in each oven correspond with the drop sleeves. The charging car is driven by an A.C. motor. The coal for the ovens is stored in a reinforced concrete bin with a storage capacity of 2500 tons. It is built in five bays with four hoppers per bay. One bay (containing 500 tons) is entirely separate and may be used for experimental purposes.

The coke oven gas passes from the ovens through ascension pipes into steel gas collecting mains. Flushing sprays are installed in each ascension pipe and in the collecting main at alternate ovens. Two liquor flushing pumps are supplied, one acting as a spare. Each has a capacity of 50,000 gallons per hour. A Shallcross governor controls a butterfly valve in the offtake mains, and so accurately regulates the pressure in the gas collecting main.

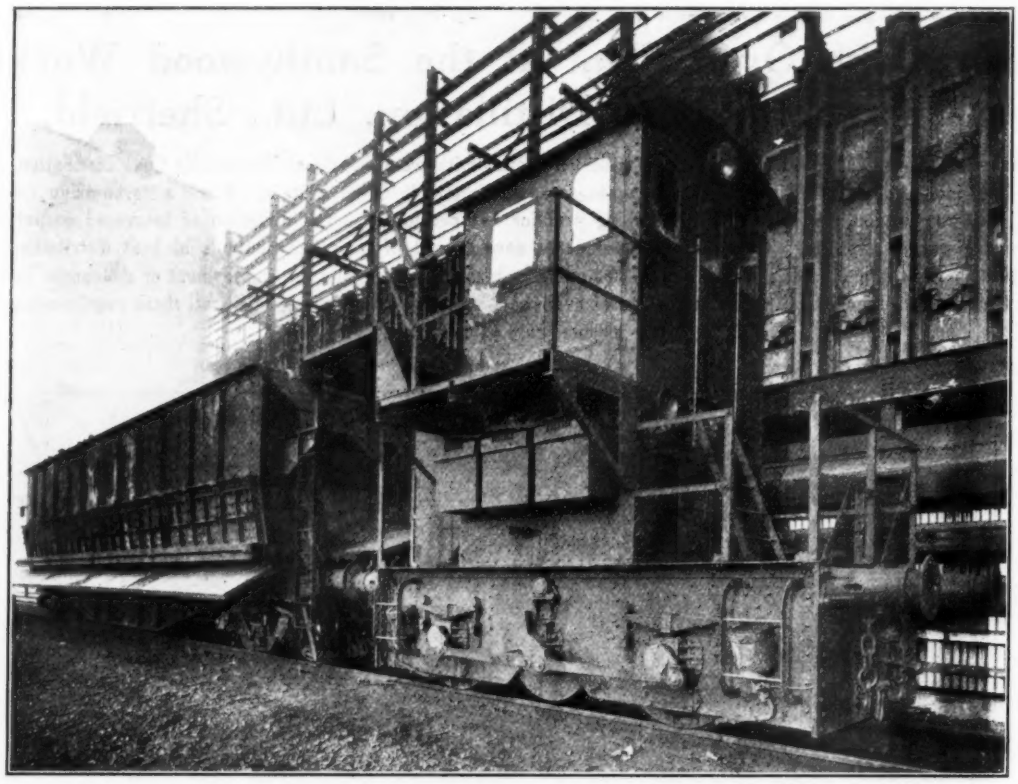
Coke Pushing and Quenching.

When the charge of coal is carbonized, the coke is pushed by means of a pusher machine into a coke quenching car. The pusher machine carries a ram which is built up of structural steel with a cast-steel head.

In addition to the ram, it carries a rope-driven leveller bar to level coal in the ovens, and a door ram to remove the doors.

The pusher ram pushes the coke into a coke quenching car which has a capacity of approximately 11 tons. The bottom of the car is constructed of sloping cast-iron plates. It has four side gates of ribbed cast steel, operated by air cylinders, and is driven by an electric locomotive.

A special door lifting machine runs along a track on the coke side of the bench and removes the doors on this side. On the same side a coke guide, which runs on rails, directs the coke into the coke quenching car as it is pushed from the ovens. The coke quenching car with its content of red hot coke is run under the brick tower of the central quenching station. It is



COKE QUENCHING CAR.

then sprayed with a pre-determined quantity of water. A 10,000-gallon quenching tank feeds the sprays through 16-in. diameter piping. Two quenching water pumps are provided. Each has a capacity of 33,000 gallons per hour. One pump acts as standby to the other. The pumps are automatically operated by float control in the overhead quenching tank. A breeze settling sump is provided beneath the tower.

After quenching, the coke is conveyed to the inclined coke wharf where it is spread out and is finally cooled before being delivered to the screening plant.

Heating System of the Becker Oven.

The basic feature of the Becker coke oven is the crossover flue. This arrangement makes it possible to employ horizontal flues of small dimensions in spite of the big volumes of gas to be handled, thus ensuring great strength of battery structure, even heat distribution at every point on the oven wall, and high thermal efficiency.

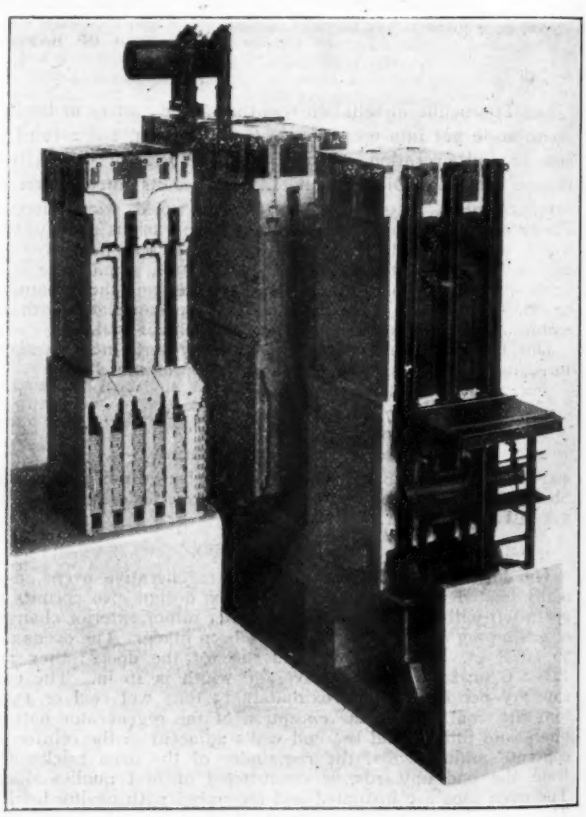
One of our illustrations shows a sectional view of the Becker oven. The flow of the heating gases may briefly be described as follows: There are a series of vertical flues on each side of each oven. Two regenerators are built under each series of flues. Air travels up the regenerators and meets gas at the base of the vertical combustion flues up which the gases travel in parallel. The products of combustion are collected from each four or five vertical flues, and are carried over the top of the ovens by means of crossover flues. There are six crossover flues to each alternate oven. The intermediate ovens have no crossover flues. From the crossover flues the waste gases are distributed into vertical flues exactly opposite the flues up which they have travelled on the other side of the oven. They travel down the vertical flues, and are equally distributed in the two regenerators below. This arrangement of heating ensures that the travel of gases is short and the speed slow, so that excellent regulation can be obtained with a low pressure differential. The heating gases in all the vertical flues on one side of an oven always travel in parallel flow, and there is no possibility of short-circuiting and consequent loss of efficiency.

The volume of gas burnt in each vertical flue is so graduated that more heat is supplied at the wider end of the oven in order to ensure even carbonization throughout the charge.

Heating Arrangements.

The coke oven gas, which is the fuel normally used for heating the ovens, passes through a steel main to the combustion flues. The volume of fuel gas to the ovens is recorded and integrated by a Kent's venturi type meter. 240 reversing valves are arranged, 120 on each side of the battery, for the controlling and reversing of air and waste gases in the regenerators.

Another of our illustrations shows the automatically operated air inlet and waste-gas outlet valves. They are opened and closed alternately in groups of four and are suitably situated in a spacious covered alley-way, giving maximum convenience to the operators. Reversing is automatically effected every 30 minutes by a single machine, which is connected to the individual gas cock levers and reversing valves. The important moving parts are totally enclosed, the machine being placed in the control room at the end of the battery. The machine is



Sectional View of Becker Oven.

normally operated by an electric motor; but a steam operated standby is provided, which can be used in case of power failure.

The movements of the machine are controlled by an electric clock, which can be set to operate the reversing mechanism at various intervals. Should the clock fail for any reason to operate the mechanism at the pre-determined time, within one minute the water safety device causes a steam siren to blow.

Air and Waste Gas Reversing Valves.

One of the outstanding features of the Thorncliffe installation is that every precaution has been taken to ensure regular operation of the plant year in and year out, without disorganization of coke and gas production. Thus, at one end of the battery a ram changing station is built holding a spare ram and leveller bar, so that these may be fitted on the pusher machine with the minimum of delay. The spare doors are fitted on each side of the battery ready to move into position should a door temporarily fail.

Another feature of Becker oven construction clearly shown at Thorncliffe is the great strength of the design.

Bye-Product Recovery.

The ammonium sulphate recovery plant and the power plant —*i.e.*, exhausters, boosters, generating sets, &c.—are housed in a building 140 ft. long, 95 ft. wide, and about 30 ft. high. The building is divided into two sections, one the power house, the other the bye-product house.

The process of ammonia recovery employed at Thorncliffe is termed the "semi-direct" process, and may briefly be described as follows;

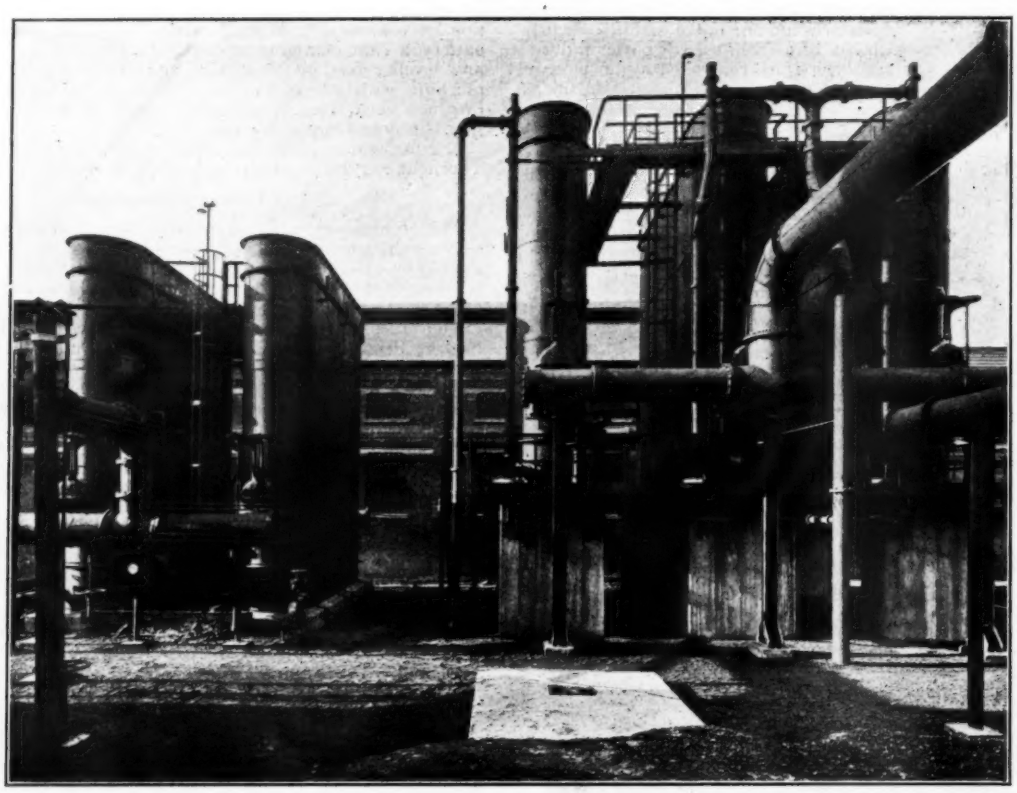
The gas is drawn from the ovens by the exhausters to the primary coolers, which are of the indirect vertical water-cooled type. In these coolers tar, naphthalene, and a certain amount of ammoniacal liquor are condensed. There are two final coolers at Thorncliffe. The cooled gas then passes through the exhausters to the tar extractors and reheaters. Two combined type extractor-reheaters are supplied, one to act as standby. Here the tar fog is extracted, and the gas is reheated to the requisite temperature for the efficient production of sulphate, prior to its entry into the saturators. There are two saturators, one acting as a standby. They consist of steel shells resting on cast-iron bottoms, and are lead lined. The cracker pipes are also of lead. The gas bubbles through the sulphuric acid and then passes through an acid separator to remove any traces of acid. The salt produced is removed by bronze ejectors and is drained in lead-lined draining boxes. It is then dried in centrifuges. Two of these operate, and a third acts as a spare. These centrifuges are of the suspended self-balancing type and are driven by high-speed vertical steam engines. The ammonium sulphate is finally neutralized and dried in Phillipson machines.

An ammonia still is provided to distil the ammonia condensate from the primary coolers. The free section contains six trays, the fixed section nine. The ammonia so produced passes into the gas stream immediately before it enters the saturator. A steel storage tank with a capacity of 150,000 gallons is provided for ammoniacal liquor storage. The two steel tar storage tanks have a capacity of 60,000 gallons each.

Benzole Recovery and Rectification Plant.

After leaving the bye-product building, the gas passes through final coolers and is then debenzolized in two tower scrubbers. These are 100 ft. high, and are packed with wooden hurdles.

SULPHATE NEUTRALIZERS AND DRIERS.



PRIMARY AND FINAL GAS COOLERS.

The gas passes up through the towers and meets a descending stream of wash-oil, which absorbs the light oils. The wash-oil enriched with benzole is delivered into a specially designed distilling apparatus provided with the necessary heat exchangers, condensers, and coolers. In order to effect heat economy, two heat exchangers are provided. In the first, the heat from the light oil vapours is transferred to the cold benzolized oil. In the second, the hot debenzolized oil is cooled, at the same time further heating the benzolized oil. Two final heaters are provided, one operating and one spare, in which the benzolized oil is finally heated before it enters the still. The light oil is distilled from the wash-oil by intimate contact with steam in a cast-iron still composed of a series of trays.

Final cooling of debenzolized oil and of light oils is effected in open type coolers. The wash-oil cooler has eleven banks of 2-in. galvanized pipes.

The benzole rectification plant consists of two stills, two agitators, and two naphthalene pans. One still is for distilla-

REVOLVING PLATE COAL FEEDERS.

tion of crude light oil and one for motor spirit distillation. Each is equipped with a dephlegmator, a cooler, and separators. The agitators wash the crude products with acid and soda. The still residues pass to the naphthalene pans, where naphthalene is crystallized out.

The principal apparatus for the recovery and rectification of benzole is housed in a steel-framed, brick-filled building. It is 41 ft. long, 38 ft. 6 in. wide, and 44 ft. high. The five wash-oil circulating pumps are housed in a "lean-to." An acid regenerating plant was supplied under a separate contract by Messrs. Coke & Gas Ovens, Ltd.

In the process of rectification, the benzole is washed with sulphuric acid, 97 p.ct. The acid sludge resulting from this has always been a source of trouble to coke oven installations. In recent years a plant has been introduced from which, in addition to recovering the remainder of the free acid, there is also recovered such benzole as is mechanically carried away by the sludge; but there has still been a pitchy residue for which no use has been found, and which accumulates in the course of time on colliery refuse heaps. At Thorncliffe, a new type of plant has been erected in which the free acid is removed from the sludge by stirring with mother liquor from the sulphate saturator, and the benzole is removed by distillation. Before allowing any part of the sludge to attain a high temperature, it is mixed thoroughly with coke oven tar, and thus the substances which used to form a pitchy residue remain as tar and pass into the main tar storage tanks of the plant. Thus, the whole of this sludge which has hitherto been regarded as a nuisance is recovered in a useful and profitable manner.

Exhauster and Pump House.

The power house contains the following machines:

(1) *Exhausters.*—Two direct-coupled steam turbine driven high-speed turbo-exhausters; one only operates at a time.

(2) *Gas Boosters.*—Two motor driven compressors, one operating and one reserve. These are used for supplying surplus gas to the Sheffield Gas Company, and each is capable of taking 4 million c.ft. of gas per 24 hours and delivering it at a pressure of 15 lbs. per sq. in. The driving motors are of the synchronous type for power factor corrections.

(3) *Gas Meter.*—One "Connersville" positive type meter, capable of measuring under normal load 6,500,000 c.ft. per day.

(4) *An Air Compressor* for compressed air services on the plant.

(5) *Two Liquor Flushing Pumps,* one steam turbine driven and one motor driven.

In the same building is provided a central manometer gauge board showing all pressures throughout the bye-product building, also recording and indicating pressure gauges for live and exhaust steam, compressed air, and flushing liquor.

The power house contains electric power generation plants. There are two 2-stage steam engines, each driving a 250-KW. generator, and also a 6-cylinder gas engine driving a 400-KW. generator. When the whole of these generators are in operation, not only are the power requirements of the plant fully maintained, but there is also a considerable surplus of power available for sale to the Associated Colliery Company.

A gasholder with a capacity of 100,000 c.ft. is provided, which ensures a supply of gas at constant pressure for use in the battery, boilers, and boosters.

Auxiliary Plant.

Coal Handling.—Washed coal is received from three points by aerial ropeway and is delivered to three hoppers. Thence it is discharged through revolving plate feeders on to a belt conveyor, and so to the oven coal bin. A rotary tippler and a track hopper are also provided. These allow of receiving coal in railway wagons. A second belt conveying system connects the track hopper with the three hoppers normally fed by the aerial ropeway.

Coke-Handling.—Coke from the inclined wharf is fed through finger gates to a belt conveyor and is delivered to a 2½-in. rotary grizzley screen. The oversize is delivered on to a boom conveyor and passed direct into trucks. The undersize is transferred to a 1½-in. "Gyrex" screen; the oversize again being loaded (by boom conveyor) into trucks.

The undersize is transferred to the secondary screening station. A 1-in. rotary screen and a ⅝-in. Hummer screen finally grade the coke. The three sizes so produced (*i.e.*, 1½ in.-1 in., 1 in.-⅝ in., and ⅝ in.-0) are stored in three separate bins. Thence, the breeze is conveyed to the boiler house by means of a belt conveyor system, and the other two sizes are discharged into railway wagons below.

Boiler Plant.—Two steam water-tube boilers are provided for raising the necessary steam to supply the complete installation. Each is capable of supplying 20,000 lbs. of steam per hour at 250 lbs. per sq. in. pressure, and 100° Fahr. superheat. They are equipped with mechanical chain grate stokers for firing with coke breeze; and also with gas burner equipment for coke oven gas firing.

It will thus be appreciated that this installation typifies all that is best in modern coking practice, and the Thorncliffe Coal Distillation Company are to be congratulated on their enterprise in installing such a plant. The complete bye-product coking installation was designed and erected by the Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd., of Allington House, 136-150, Victoria Street, S.W. 1. The power generation plant was, however, transferred from some old plants belonging to Thorncliffe Coal Distillation, Ltd.

Practically all the constructional ironwork and steelwork of the plant were produced by Messrs. Newton, Chambers, & Co., Ltd., whose collieries also supply the coal.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Private Bills.

The Ascot District Gas and Electricity Bill and the Hartlepool Gas and Water Bill have been referred to Committees. Petitions have been presented by Messrs. Sharpe, Pritchard, & Co., on behalf of the Durham County Council and the West Hartlepool Corporation, against the Hartlepool Gas and Water Bill.

The Brixham Gas and Electricity Bill has been reported with amendments from the Committee on Unopposed Bills, and is now awaiting third reading.

Special Orders.

The following Orders are awaiting consideration by the Special Orders Committee: Swaffham, Woking, and Redcar.

Coal Mines Bill.

On the Report Stage of the Coal Mines Bill, Viscount Hailsham, speaking on an amendment which would enable a Committee of Investigation to report to the Board of Trade any provision in a scheme which was "unduly interfering with the supply or sale of coal or any class of coal at a reasonable price," made the following reference. One of the matters about which he felt some anxiety was the power given to the Board in a district consisting exclusively of coalowners to make such arrangements as might unfairly differentiate against one class of consumer that they did not desire to encourage and in favour of another class of consumer that they did desire to encourage. They might, for instance, desire to increase the consumption of gas and to discourage the consumption of electricity, and they could do it quite easily by unfairly discriminating between those two classes of consumer in regard to price. As the clause now stood, this would be guarded against, because the person who was unfairly treated would have a right to apply to the Committee, but on the clause as it was now proposed to be amended, he would have no right at all. The amendment was negatived.

Speaking on a later amendment to provide an appeal to the Railway and Canal Commission on such cases, Viscount Hailsham said, referring to the Committee of Investigation, that when there were only two consumers on the Committee it was quite obvious that, with the best will in the world, they could not represent every class of consumer. If they had one exporter and one domestic consumer, then the big trades and the gas and electricity people would be left out. A consumer might well come before the Committee, and have nobody there who in the least represented his point of view, or find people who might be directly in rivalry with him. The amendment to provide an appeal was adopted.

House of Commons.

Private Bills.

The petitions of the Maltby Urban District Council and the Rotherham Rural District Council against the South Yorkshire and Derbyshire Gas Bill have been withdrawn, and the Bill has been referred to the Committee on Unopposed Bills.

Smokeless Fuel.

Mr. Simon asked the Secretary for Mines whether the Fuel Research Board had been successful in finding more efficient or more smokeless methods than those now in force of heating working-class houses, and, if so, whether a report would be published giving practical recommendations that would be of use to local authorities and builders.

Mr. Turner replied that the Department of Scientific and Industrial Research, through its fuel and building research organizations, had conducted a large amount of research on the problems involved in the improvement of methods of domestic heating, and a number of reports had been published, of which he was sending the Hon. Member a list. As regards eliminating the production of smoke, this was primarily a question of the use of electricity or smokeless fuels. Extensive investigations had been carried out at the Fuel Research Station into the production of smokeless fuels, especially by improving methods of gas manufacture and the manufacture of coke suitable for domestic purposes. The best methods of heating in relation to any particular housing scheme depended so much on local conditions that it was not considered practicable at present to prepare a report which would contain practical recommendations suited to every case; but the Director of Fuel Research was always ready, if asked in any particular case, to give all assistance and information he could to local authorities and others connected with such schemes.

Commercial and Industrial.

Stock Market Report.

[For Stock and Share List, see later page.]

Apart from the activity in British Funds, which continued to dominate the situation on the Stock Exchange last week, quiet conditions prevailed in most markets, and the Gas Section was no exception to the general rule. There was comparatively little stock available, and anything coming into the market was speedily absorbed. Prices, however, remained firm, and in a few instances showed slight improvements. South Suburban ordinary rose 1 point to 102½; and at the local Exchanges, Liverpool ordinary gained ½ and Newcastle and Gateshead consolidated 3d. per £1 unit to 16s. 6d. The Commercial and Liverpool ordinary stocks, which at the present time are standing at the rather low price of 91½ and 92 respectively, are well worth the attention of intending investors. The former Company has distributed 6 p.ct. for the past three years, and at the current price shows a yield on this rate of £6 11s. 1d. p.ct. At one time last year the stock was changing hands at 102. The Liverpool Company has distributed a similar amount since 1928, and the yield in this case is £6 10s. 5d. p.ct. The present price of the Cardiff Company's stock, however, on the same rate of dividend is 97½; but it is possible that a large local demand may be a contributing factor towards some portion of the higher price.

Further new issues of stock have been notified this week—viz., the Prescott and District Gas Company, 10,000 6 p.ct. £1 preference shares at par, and the Rugby Gas Company £4700 5½ p.ct. redeemable mortgage debenture bonds also at par.

Coal Markets.

Reports from all the markets continue to show that depression is widespread. Yorkshire had indications last week of a slightly better tone in the shipment section, but taken all round the prospects both for home and export trade are extremely bad. Continental stocks are still abnormal, and competitors are cutting prices to obtain such orders as come into the market. Idle time at the collieries is common, and in many places men are being discharged, and pits laid off altogether.

Gas coal, as is to be expected at this season, is exceptionally quiet. Nominal quotation in Durham remain more or less unchanged, but the ordinary makes especially are having a very lean time. Seconds are quoted at 13s. 3d. to 13s. 9d. f.o.b., with Wear specials at 16s. 6d., and best qualities 15s. 9d. The export price for Yorkshire screened gas is 16s. to 17s. f.o.b.

The demand for gas coke is well maintained, and 21s. 6d. f.o.b. is still the current price.

Trade Notes.

Lighting Trades' Birkenhead Contract.

The Birkenhead Corporation Gas Committee have accepted the tender of Lighting Trades, Ltd., of London, for the supply of mantles for a period of 12 months.

Sludge and Dust-Handling Plant for Dawsholm.

The Glasgow Corporation Gas Committee recommend the tender of Messrs. Simon Carves, Ltd., for sludge and dust-handling plant at the Dawsholm gas-works.

Tully Plant for Sanquhar.

The Town Council of Sanquhar, Dumfriesshire, have placed an order with Messrs. Tully, Sons, & Co., Ltd., Newark, for their latest type of plant, complete with waste-heat boiler and mechanical operator, of 75,000 c.ft. daily capacity.

London Office for the Lea Recorder Company.

With a view to further extending their business and dealing more expeditiously with inquiries, the Lea Recorder Company, Ltd., of 28, Deansgate, Manchester, have recently opened a London Office at Parliament Mansions, Orchard Street, Victoria Street, S.W. 1. (Telephone: Victoria 0984.) The office is in charge of Mr. J. E. Crawshaw, who has been with the firm for the past seven years, and is well qualified to discuss all kinds of problems connected with the measurement of water, steam, coal, &c. This office is really a combined office and showroom, in which various types of water meters and coal meters can be inspected at any time.

Nature Allied to Industry.

The Carron Company, of Falkirk, have recently published an interesting pamphlet on the Story of the Swan Workers at Carron, in the belief that it will not be without interest to their numerous business friends. As the works at Carron increased, and to provide against scarcity of water for power, huge reservoirs known as the "Carron Dams" were formed, which during the passage of time have been transformed in appearance to a beautiful natural lake. Accompanied by charming photographs, this pamphlet tells the story of the inhabitants of the waters, particularly the swans, which have rendered faithful service to the Company as scavengers of the Carron Dams from the earliest days. The population has gradually increased, and the latest census shows that there are now exactly 100 of these unpaid feathered workers, making a pleasing alliance between Nature and industry.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

London, *May 26.*

To-day's prices for tar products are as follows:
Creosote for export is 6d. to 6¼d. per gallon f.o.b.
Pitch is 47s. 6d. per ton f.o.b.
Pure toluole is 2s. 3d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; pure benzole, about 1s. 11d. per gallon; and pyridine bases, 3s. 9d. per gallon.

Tar Products in the Provinces.

May 26.

Markets for tar products are quiet.

Pitch is steady; but it is probable there will not be very much business doing now until the beginning of the autumn.

Creosote is firm, and export shipments are going forward quite satisfactorily.

Water-white products are steady. There is a good demand for all grades.

Tar acids are quiet, and prices are easier.

Crude carbolic is 2s. 3d. to 2s. 4d. for delivery to the end of June, but for July/December 2s. 2d. would probably be accepted.

The average prices of gas-works products during the week were: Gas-works tar, 21s. to 26s. Pitch—East Coast, 46s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 46s. f.o.b.* Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 1¾d. to 1½d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 3d. to 2s. 4d. May/June, 2s. 2d. July/December. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum, 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

Glasgow, *May 24.*

More activity is noticeable in the industry, and refined tar in particular is now moving in substantial quantities. Creosote oil is also improving, and stocks in this area are remarkably low.

Pitch.—The nominal value is unchanged at 47s. 6d. per ton f.a.s. Glasgow for export. Home price is about 47s. 6d. per ton *ex* makers' works.

Tar.—The output is increasing in volume, weather conditions being favourable at present. Value is steady at 3¼d. to 3¾d. per gallon in buyers' packages f.o.r.

Creosote.—Stocks are gradually decreasing, but prices remain weak. B.E.S.A. specification is 3½d. to 4d. per gallon; low gravity, 3d. to 3½d. per gallon; neutral oil, 3d. to 3¼d. per gallon; all free on rails works.

Cresylic is unchanged. Pale 97/99 p.ct. is 1s. 8¾d. to 1s. 9¾d. per gallon; dark 97/99 p.ct. is 1s. 7¼d. to 1s. 8¼d. per gallon; pale 99/100 p.ct. is 1s. 11½d. to 2s. 0½d. per gallon—all free on rails works.

Crude naphtha is easy at 4¼d. to 4¾d. per gallon *ex* makers' works.

Solvent Naphtha.—Quotations are firmer, but very few orders are passing. 99/160 grade is about 1s. 2½d. to 1s. 3½d., and 90/190 grade about 1s. to 1s. 1d. per gallon.

Motor benzole continues rather scarce, with value steady at 1s. 6¼d. to 1s. 6¾d. per gallon f.o.r. works in bulk.

Pyridines are without interest; 90/160 grade being nominal at 3s. to 3s. 3d. per gallon.

Benzole Prices.

The following are considered to be the market prices at the present time:

	s. d.	s. d.	
Crude benzole	0 10	to 0 11	per gallon at works
Motor ,,	1 5½	,, 1 6½	,, ,, ,,
Pure ,,	1 10	,, 1 11	,, ,, ,,

Contracts Open.

Coal.

The Sittingbourne Urban District Council invite tenders for the supply of gas coal. [See advert. on p. 524.]

The Hebden Bridge and Mytholmroyd Gas Board invite tenders for the supply of gas nuts. [See advert. on p. 524.]

The Directors of the Chapel, Whaley and District Gas Company invite tenders for the supply of gas nuts. [See advert. on p. 524.]

Pipes.

The Chelmsford Corporation Gas Department invite tenders for the supply of cast-iron pipes and specials. [See advert. on p. 524.]

Imperial Continental Gas Association.

Annual Meeting.

The One Hundred and Eighty-Second Ordinary General Meeting was held at Winchester House, Old Broad Street, London, on Wednesday, May 21, at 2.30 p.m.—Colonel H. LE ROY-LEWIS, C.B., C.M.G., D.S.O. (Chairman), presiding. There was a large attendance of shareholders.

The SECRETARY (Mr. W. E. Bowers) read the notice convening the meeting and also the auditors' report.

The CHAIRMAN: I presume you will take the Directors' report and accounts, which you have all received, as read.

This was agreed to.

The CHAIRMAN: My Lords, Ladies, and Gentlemen:

It is now my duty to move that the report of the Directors and the audited statement of accounts for the fifteen months ended March 31, 1930, already printed and circulated amongst the proprietors, and now read, be adopted.

Before putting this motion to the meeting, I should like, with your indulgence, to deliver my annual address.

You will see by the report and accounts in your hands that these, which are submitted for your approval to-day, cover a period of fifteen months. I pointed out the necessity for this at our last meeting. The accounts of our direct branch establishments were formerly closed on Dec. 31, and the profit of the year to which they related directly benefited, but the accounts, which are now before you, include fifteen months' expenses and only twelve months' receipts.

As the result of the conversion of those branch establishments into subsidiary companies it has been necessary to wait a further period of three months in order that the accounts now before you should benefit from the profits of 1929 as, naturally enough, dividends out of the profits of the subsidiary companies cannot be declared on Dec. 31, the date upon which the accounting year of most of our subsidiaries ends, but only after a suitable interval has elapsed for the preparation and auditing of their accounts.

In consequence, I must ask you, in considering the result of these accounts, to disregard the fact that they nominally cover a period of fifteen months, for the actual results which they incorporate are strictly comparable with those for the twelve months ended Dec. 31, 1928.

I think you will, therefore, agree that we can consider the results before us as satisfactory. You will observe that the profit for the period shows an increase of £80,000 on the previous year, but in point of fact the results, on a strictly comparative basis, are more favourable than this.

This year it has not been necessary for the Imperial Continental Gas Association to make any provision for amortization; the charge last year was £51,000; our new subsidiary companies have placed to amortization and other reserves the sum of £73,000, so that, taking the consolidated result, reserves prior to the formulation of our own profit have increased by £22,000; our profit itself has increased by £80,000; our year's trading therefore shows a total improvement of £102,000.

I will not disguise the fact that your Board were quite prepared to see a reduction in our profits owing to the fact that our new subsidiaries, instead of transferring the whole of their profits to the Imperial Continental Gas Association out of which we used to build up our own reserves, are naturally retaining part of their profits for the purpose of creating their own reserves.

I now propose to take you through our accounts item by item.

Taking the credit, the right hand, side of the profit and loss account, you will observe that the net revenue from stations shows a decrease of £354,000. This decrease arises entirely from the fact that the profits of the Belgian enterprises, being no longer directly owned, do not now figure under net revenue from stations. As investments, they contribute to swell dividends, rents, and sundry revenue, which show an increase of £413,000, so the decrease in net revenue has been more than offset by the increase under the head of dividends; in fact, we find ourselves, taking the two items together, £59,000 to the good.

It is this item, coupled with the disappearance from our accounts of the amortization charge for the previous year of £51,000, which has combined to give us our increased profit. Our net revenue would, in fact, have been higher; but, as most of you are well aware, it has always been a practice of this Company to deal generously with all its employees, and therefore this item has suffered as the result of a charge against it for pensions of some £12,000. These pensions, naturally, do not relate to stations from which our net revenue is derived. They are survivals, in a large part, of the exploitation of the gas supply of Vienna, which was lost in 1912. In the ordinary course of events this item will undergo shrinkage year by year as our pensioners die.

Dividends, rents, and sundry revenue are made up as follows: Dividends on foreign shareholdings, £334,000; dividends on home investments, £102,000; interest, £35,000; and rents, £121,000.

I propose to give you details later of the performances of our various subsidiary companies, and I would only pause here to remark that the dividends which these companies have declared have permitted ample provision to be made in their accounts for reserves against all normal contingencies.

On the debit side of the profit and loss account, administration and general expenses show an increase of £12,000. There has been a considerable saving on account of administration alone, as the figure before you covers fifteen months' expenses, while the income-tax charge included in it is, owing to the expansion of our profits, £10,000 higher than the corresponding charge for 1928.

Interest on debenture stock shows an increase of £1700 owing to that interest having been calculated for the full period of fifteen months, instead of twelve months as in the previous accounts.

The item of £16,000 for interest on new capital stock will not reappear as it represents the interest payable by the Association upon the cash subscribed for the new stock, which only ranks for dividend as from April 1 of this year; that is to say, it will rank equally with the old stock for dividend in our next accounts.

Leaving the item "profit" for a moment, and turning to the balance-sheet, you will observe on the asset, the right-hand, side that the item "Works, Mains, &c.," shows a shrinkage of £1,800,000, and that "Stocks at Stations" shows a decrease of £134,000. This is due to the fact that the assets represented by the difference have been transferred to the new companies which we have formed, and "Investments" therefore show a more than corresponding increase.

"Works, Mains, Lands, and Freehold Properties," amounting to £2,000,000, covers, of course, our directly controlled stations at Flushing, Prague, and Graslitz. In addition, owing to difficulties in completing the necessary formalities for the transfer of certain assets to these new subsidiary companies, this item still contains £420,000 of assets which probably before our next balance-sheet will be ceded to our new subsidiaries.

Over and above these items we still retain in our direct ownership various properties, the ultimate destination of which has not been finally decided. These properties are for the most part leased to the operating companies, and their contribution to our revenue appears under the head of rent.

Sundry debtors stand at £224,000, as compared with the corresponding figure in our last balance-sheet of £527,000. This difference is more apparent than real, as it arises from a re-grouping. Last year our advances to our associated companies were included under the heading of sundry debtors, whereas this year we have thought it advisable to show them separately. The sub-division of the item of £224,000 is £62,000 in respect of sundry debtors, mainly debts due to the direct branch establishments which we still retain in Holland and Czecho-Slovakia, and £162,000 in respect of dividends which were declared prior to March 31 by our Belgian Companies, but which had not been paid by that date. These dividends were received before our accounts were in final draft.

As regards loans to associated companies, your Board are of opinion that it is preferable not to have constant resort to increases in the capital of these subsidiary companies, but, as far as possible, to finance them during this period of intensive development by means of loans. The time will naturally arrive when these loans will have to be repaid, funded, or exchanged against shares.

A very close watch is exercised over the borrowings of our subsidiaries, but we have by no means reached the limit of the advances which it will be necessary to make to enable them to carry through their immediate programmes.

"Cash and Short Loans" shows an increase of £158,000 upon last year. Since then we have received the proceeds of the new capital issue, amounting by March 31 to £920,000, but the greater part of the capital so provided has already been absorbed by the capital expenditure of our subsidiaries.

The next heading, "Investments," covers the vast majority of the Association's assets. In addition to our foreign holdings, we held on March 31 last, English, Colonial, and Indian securities with a book value of £1,569,000, a figure below their market value.

On the liabilities side of the balance-sheet you will observe that at the time of closing our accounts the new stock had not been fully subscribed, as the final instalment fell due only on March 31. The whole amount has now been paid up.

The item "Sundry Creditors" shows a decrease of £184,000, as a large part of our old stations' creditors has been transferred to the new companies. Further, the debt to the Commissioners of Inland Revenue is lower by £78,000, owing to the outstanding income-tax having been paid before the accounts were closed.

The principal item under sundry creditors is our pension reserve of £350,000. The future of this fund will be considered when certain questions in regard to the pension liability of our old stations, now converted into separate companies, have been settled.

Our general and specific reserves show an increase of £626,000, this increase being due to the appropriation of £70,000 from the 1928 profit, to the premium on the new capital stock, and to profits upon the realization of investments and other assets.

The sum available for appropriation is £666,000, out of which an interim dividend of 5 p.ct. has already been paid, leaving for final appropriation the figure given in the balance-sheet of £587,000.

This figure of £666,000 constitutes a record for this Company. If we exclude the years which benefited by the adventitious profits accruing from the liquidation of our German undertakings, the nearest approach to to-day's figure was in 1911, when the profit available for appropriation amounted to £583,000. It must be remembered that in 1911, in addition to the towns we supply to-day, the Association owned the gas supply of Berlin, Hanover, and Aix-la-Chapelle, and a substantial investment in the Frankfurt Gas Company. Those undertakings are now lost to us, and in the years immediately succeeding the war you received very substantial cash sums out of the proceeds of their liquidation.

I will not say that the Association has risen phœnix-like from its ashes, although during the dark days of the war complete reduction to the ash stage did not seem far away; nevertheless, without indulging in any exaggerated claims, I think we are entitled to congratulate ourselves that the Company has made such a good recovery.

The revival in our fortunes is largely due to the great development

which has taken place in the sale of electricity, for whereas in 1913 our output of current amounted only to 2 million units, during the year under review the companies in which we are interested sold 148 million units of current.

On the other hand, our output of gas, which during last year amounted to 282 million cubic metres, shows a drop upon the output of 1913, when it stood at 465 million cubic metres.

You will see that our position roughly is that there has been a drop in our gas sales of 183 million cubic metres and an increase in our sales of current of 146 million units. It should not be deduced from this that gas has failed to make headway; the reverse is, in fact, the case, as the 1929 consumption of the towns which we still supply shows an increase of 41 p.ct. upon the consumption of those towns in 1913. The drop in question is entirely due to the loss of our German undertakings. I remain hopeful, however, that in the course of a very few years, if the development which we have in mind for our gas interests does not disappoint us, we shall stand again at the 1913 gas consumption.

The tariffs by means of which our profits have been earned are among the lowest in the world. Our average price at Antwerp for gas supplied for ordinary private consumption during last year, without any discount, was the very modest figure of 2s. 10d. per 1000 c.ft., or 7¼d. per therm.

For electricity at Brussels our average receipt was 2¼d. per unit for current for lighting, 1d. per unit for motive power supplied at low tension, and just under ¾d. per unit for current supplied at high tension.

The extreme moderation of these prices proves that the exaggerated control to which public utility companies are subjected in England does not achieve the object which it has in view, for we, while operating under a system which, although not without restraints, gives public utility enterprises much greater latitude than exists in this country, are able to supply gas and current at lower prices and still earn a fair rate of remuneration on our capital.

In view of the profit which is available for appropriation, your Board feel justified in recommending to you an increase of the rate of dividend from 15 p.ct. to 17½ p.ct., less tax. This will enable us to appropriate £70,000 to reserves, to pay a profit-participating bonus to the staff, than which no payment gives me greater pleasure, at the rate of 1 p.ct. of the net amount distributed to the proprietors, and to increase the carry forward from £198,000 to £323,000. We shall thus have in our carry forward a sum almost adequate to pay this year's full rate of dividend upon a capital of £2,500,000; a dividend equalization fund is thus in effect created without any depletion of our general and specific reserves.

There is now a salutary custom of letting the proprietors of public utility holding companies know in what undertakings they are interested, and I therefore propose to give you some idea as to the nature of our holdings, but in so doing let me enter a caveat against the possibility of making any valuation of these; such estimates are bound to be misleading, and to excite false expectations in our minds; though you may own a majority holding in a company whose stock or shares are quoted at a substantial premium, this does not necessarily imply that you would be able to realize anything like the market valuation were you to try and force a sale; indeed, the larger your holding and the more imposing your valuation, the less likely are you to attain your ends, because the sums involved are subject to financial arrangements, which may be difficult or impossible to make, and therefore it is unwise to attempt any valuations based on the expectation of a sale.

I have always looked upon our Association as essentially a producer, though now for various reasons of a political nature we have perforce become a holding company, and I deprecate any idea of turning ourselves into a financial undertaking, with the mentality of stock jobbers; let us rather look upon the companies we now control as producers and see what we may expect from them as such. I do not wish you to understand that if a brilliant sale of one of our companies were to come within the region of possibility it would necessarily be our duty to refuse to negotiate, and I hope you will understand that your Board is not adverse in principle to the idea of a possible sale, but what I am trying to imply is that this is not our primary function.

In giving you the information, which I now propose to do, please to remember that I am not only addressing you, but our rivals and some of the public authorities with whom we do business, and that they are not unmindful of what I may say, so that if I am occasionally more reticent than you would wish me to be, I hope you may see your way not to exact any more information than I am now disposed to give you.

One of our most important investments is the Compagnie Continentale du Gaz; made up of a variety of amalgamations, it now holds concessions in some of the most important industrial districts in France, and is developing in a satisfactory manner. Its capital is about Frs. 200,000,000, of which this Association holds the majority. To give you an idea of its rate of progress and of the results obtained, I may mention that for the financial year ending June, 1924, its output of gas was 75,150,000 c.m., whereas at the end of June, 1929, it was 86,746,000 c.m., an increase of 15·4 p.ct. More satisfactory results have been obtained in its electrical business, for in 1924 it produced 51,670,000 units and in 1929 85,905,000 units, an increase of 66·2 p.ct. The net profit at the end of the financial year 1924 was Frs. 12,703,000, and at the end of 1929 Frs. 31,811,000, an increase of 150 p.ct., while the dividend we receive from this company has been a constantly increasing one.

The Antwerpsche Gasmaatschappij has a capital of Frs. 300,000,000. The sterling dividend which we received from this source and which is included in the profits of the period before you, was £60,330. The gas sold by this company during the twelve months ended Dec. 31 last was 91,102,160 cubic metres, which represents an increase of 3·46 p.ct. upon the corresponding twelve months of 1928. This company has a political problem of its own to solve, but I see no reason to be pessimistic as regards its future.

The Société d'Electricité et de Gaz de l'Agglomération bruxelloise (Electrogaz) supplies, not the town of Brussels itself, but certain of the inlying suburbs. It has a capital of Frs. 98,000,000. From this investment the Association received a sterling dividend in respect of the twelve months ended Dec. 31 last of £63,833. During 1929 this company sold 32,719,437 cubic metres of gas and 24,482,695 units of electricity. These figures constitute increases of 5·7 p.ct. and 22·37 p.ct., respectively, upon the figures for the previous year.

The Société Provinciale du Gaz et de l'Electricité (Provinciale) supplies 45 of the outlying communes of Brussels with gas and electricity. The district of supply of this company comprises both urban and agricultural communes, and we trust that the development of the supply of gas and electricity to the rural communes, which at the present moment is not properly remunerative, will bear fruit in due course. During last year the Provinciale placed 37 kilometres of gas mains and 152 kilometres of electric cables, the sum of 27 million francs being absorbed in the necessary installations.

This company has a paid-up capital of Frs. 82,500,000. The Association received, by way of dividend, £38,046 for the twelve months ended Dec. 31 last.

During 1929 21,237,937 cubic metres of gas and 25,707,392 kilowatt hours of electricity were sold, these figures representing increases of 11·08 p.ct. and 12·02 p.ct., respectively, upon the figures for 1928.

The function of Les Cokeries du Brabant is solely to produce gas and coke. At the present moment the company is carrying on its operations in works which it has leased at Antwerp and Brussels from the Association, but a new coke-oven undertaking is now in course of construction at Pont Brulé, which will enable the less efficient of the present works to be put out of action. These works, which are in course of erection upon a site midway between Antwerp and Brussels, will incorporate the most modern features of coking practice, and will, we trust, ultimately enable substantial economies to be made upon the present cost of production.

The programme of this company will involve the expenditure of about £900,000. At the date of closing our accounts £330,000 had been spent, and the balance necessary will have to be found by this Association. The share capital of this company at present stands at only Frs. 16,000,000, or just over £100,000. We have advanced the difference to the Cokeries du Brabant by way of loan, but when the company comes into production it will be necessary to bring its capital more in accordance with the total amount engaged.

Our two Brussels distributing companies, Electrogaz and Provinciale, purchased the whole of their gas requirements during 1929 from the Cokeries du Brabant, and the Antwerpsche Gasmaatschappij purchased from the same source the gas required for the Antwerp suburbs, the town being supplied by the Berchem Works, which is included among the assets of the Antwerpsche Gasmaatschappij.

The financial year of this company runs from July 1 to June 30, and as it commenced trading as from Jan. 1, 1929, the Imperial Continental Gas Association accounts under review only include a dividend for the six months ended June 30, 1929, amounting to £5698, therefore considerable improvement may confidently be expected.

The Société de Distribution du Gaz (Distrigaz) constitutes the most important step which has so far been taken towards the rationalization of the gas industry in Belgium. A great deal of the gas at present produced by coke oven undertakings is utilized uneconomically because there is no satisfactory means of marketing it. It will be the function of this company to purchase coke oven gas wherever available and to undertake its transport to the centres of distribution. We have set before ourselves the programme of eventually creating one vast gas network throughout Belgium. The first stage of this programme, which is already in hand, consists in laying a collecting main, linking up Mons and Charleroi with Antwerp and Brussels. A great deal of work has to be accomplished before this company will be in full working order, but we look forward to the day when it will no longer be necessary to manufacture gas in densely-populated centres, and when all local gas undertakings will purchase from this organization their supplies of gas in bulk.

The company now has a paid-up capital of Frs. 40 million, in which we have a substantial holding.

The Union Intercommunale des Centrales Electriques du Brabant (Interbrabant) acts as the producer of electrical current for the undertakings operating in and around Brussels. It was formed in 1928, and now has a capital of Frs. 175,000,000. The distributable profit for the year 1929 was £106,000, of which the Imperial Continental Gas Association will receive in May by way of dividend approximately £22,073, which will be included in the Association's accounts for 1930-31. The accounts under review include the dividend paid to the Association in 1929 for the year 1928, amounting to £18,909.

The total current sold in 1929 was 168,434,176 units, or an increase of 36·8 p.ct. on 1928.

I should not like to leave you under the impression that the dividends paid by these Belgian Companies have led to any increase in our cash resources. Since the war the expansion of public utility companies has been rapid, and all are faced with difficulty in providing the necessary cash to finance their programmes of capital development. In America the problem has in some cases been overcome by paying a dividend in stock. It will not, therefore, surprise you to learn that not merely have we had to lend back to our operating companies in Belgium the whole of the sums which they were due to pay us by way of dividend, but that we have had to supply them from here with a further £350,000 of cash.

With the exception of the Compagnie Continentale, the companies which I have mentioned are not quoted on any Bourse. Belgian company legislation prohibits any public sale of shares by a vendor company which has received shares in return for its assets until after the publication of the second balance-sheet. This is a very salutary provision for the protection of the investor; but, in consequence, it will be necessary to wait at least a further eighteen months before obtaining a Bourse quotation for our shares. When dealings are permitted it is our intention to offer through the Belgian Bourses parcels of our various shares so as to give local interests an opportunity to associate themselves with us.

None of our holdings has been sold, but, in addition to those I have mentioned, there are various other smaller investments in foreign gas and electricity companies.

During last year our enterprises spent on capital development a

sum of £621,000, apportioned approximately as follows: £212,000 on the modernization of our gas-producing works, £51,000 on our power stations, £171,000 on the development of our gas-distributing systems, and £187,000 on our electrical distributing systems.

In addition, considerable sums have been spent in acquiring holdings in other undertakings. The new capital which you were invited to subscribe last year has thus all found its way into remunerative employment. That is the reason for inviting you again to subscribe for further capital on terms which are intended to give you a bonus.

I regret that it was not possible to announce both dividend and capital bonus simultaneously, but through circumstances outside our control we were unable at the moment of the declaration of our final dividend to form a definite opinion as to the amount of capital which would be required to see us through the forthcoming twelve months. We accordingly did the next best thing, convoked a special meeting of the Board and, without waiting for this general meeting, made the announcement through the Press the moment your Board had taken its decision. We estimate that the programme of capital expenditure of the Company will leave us with a deficit at the end of this financial year of £750,000. The cash necessary could have been provided either by realizing part of our home investments or by borrowing from the banks. We came to the conclusion, however, that advantage should be taken of this situation to give our shareholders an increased share in the prosperity of the Company, a share to which they are well entitled, as a large part of our present-day prosperity arises from their self-abnegation in the past in contenting themselves with a modest rate of dividend while the Company accumulated reserves. We have a large number of trustee holders on our books and the life-tenant was, I suppose, the chief sufferer during the self-abnegation period. We have tried to compensate them by an increased dividend at the same time, as we give to-day a capital bonus, which will benefit the general body of the trust. No joint-stock company can ever aspire to give complete satisfaction to both trustee and life-tenant, but we are, I think, to-day holding the scales fairly evenly.

For the benefit of those who do not read the newspapers I will recapitulate our proposals. Proprietors will be allotted rights to apply for £300,000 of new stock at a price of £250 per £100 of stock, which will give the Association the additional capital sum of £750,000 it requires. This will mean that for every £100 of either new or old stock which you possess you will be entitled to subscribe for £12 of new stock which will cost you £30 in cash. Letters of rights will reach you the day after to-morrow by the same post as the dividend warrant. You will be required to pay for each £12 of new stock, £15 upon application and a further £15 on July 1. Although by the time we receive your second instalment one-quarter of our accounting year will have gone, we intend that this new stock shall rank equally with all existing issues as if it had been in existence on April 1 last, so that it will receive its full share of any dividend or bonus which we may pay in respect of the year beginning April 1, 1930, and ending March 31, 1931. The effect of this new issue will be to raise our issued capital from £2,500,000 to £2,800,000, which will still leave us with £200,000 unissued of the new capital which you authorized in May, 1929.

Some of you may ask why the present issue was not combined with the previous issue which you have just subscribed and why it is being made at the price of £250 per £100 stock, whereas the price of the last issue was £200. At the time of our last issue it was impossible to foresee the full extent of our financial requirements, and I do not wish any of you to assume that this new issue represents finality. It is useless for us to ask you to subscribe unnecessarily large instalments of capital, as the higher cash subscription might have the effect of inducing you to sell instead of exercising your rights as we like to see you do. It would also be bad management on our part to call up more capital than we can legitimately hope to put to work within a reasonable space of time. We therefore propose to be moderate in our calls for fresh capital and to come to you from time to time as our requirements reveal themselves.

The justification for the increased price of issue lies quite simply in the increased dividend which we are paying and which I hope we shall be able to maintain.

The suggestion has been made to me that our reserves are too big, and that they should be made the subject of a special distribution. I would point out that before the question of any special distribution of this kind can be contemplated, it is necessary to examine the character of the assets which are behind these reserves. The assets in question are an integral part of our undertaking, and, if the suggestion were put into effect, it would involve a curtailment of our true sphere of activity.

An alternative would be to capitalize part of our reserves, but this would not increase our earning power, and I should hesitate to recommend this course. We do not wish to stand between stockholders and their lawful heritage, but we wish to be satisfied that we are giving them a reality and not a mere semblance. We have political difficulties confronting us, and our programme of normalization will need time for completion. It will, I estimate, be three to four years before we complete the tasks immediately before us. At the end of that time, if all goes well, the moment may be propitious for a complete re-organization of our capital, but there are already too many unhappy examples of undertakings which have put what they would euphemistically call the "rationalization" of their capital before the rationalization of their industry. The prestige of our Company stands high in the City, and your Board are determined to be doubly sure of their ground.

I therefore ask you to dwell in pleasurable contemplation upon our reserves in the knowledge that our investments are valued on a conservative basis, and that our real reserves are far in excess of the figure mentioned in the balance-sheet.

I have tried to give you a true picture of our position in the hope of answering by anticipation any questions which may have formed themselves in your minds. It is difficult, however, to go further in helping you to value your undertaking. We have one or two difficult corners to turn during the next three years, concerning which the less said the better; in the meantime the valuation of our stock is subject to the wildest variations, having been during the last year as low as 198 and as high as 495. These variations may have been disquieting to our proprietors, and have never ceased to be a source of wonderment to me, for were our fortunes accurately represented by these fluctuations we should, indeed, have been having a stormy time, whereas the real position of the Association has, during all this period, been in no way modified, and all that could in any way be postulated about us was that our position had been getting on the whole better and better. I would therefore urge our proprietors to be in no way disturbed by the variations in the price of our security, resting assured that, if any sensational change took place in our prospects, they would be the first to hear of it.

All value is relative, and I fear I cannot attempt to guide your feet through the shifting sands of those relativities. I will only refer you to the recent words of a very great authority, the Chairman of the New York Stock Exchange: "There is no infallible formula to determine precisely what prices share issues should sell at, and any intelligent judgment on this subject demands consideration of a wide variety of different factors."

The value that any individual may assign to public utility or other undertakings may, and necessarily does, vary with its point of view; if our enterprise is looked at from the angle of a *bona fide* investor I can safely say that in the long run he will not regret his partnership in our Association.

Sir HENRY BIRCHENOUGH, Bt., K.C.M.G. (Deputy-Chairman), formally seconded the resolution for the adoption of the report and accounts.

In response to the Chairman's invitation to the shareholders to discuss the report and accounts,

Mr. H. L. URLING CLARK congratulated the Chairman on his very interesting and lucid speech and on the considerable volume of information which he had given. Although details had been given of the amount of capital and of the amount of dividends on the Association's foreign holdings, he had not quite appreciated whether the amount of capital mentioned represented the holdings of the Association or the total amount of the capital of the Association.

The CHAIRMAN said it was the total amount of the capital.

Mr. CLARK continued that he failed to see the reason why the stockholders of the Association should not be told what were the Association's exact holdings in the various Belgian companies. The values of the Association's stocks had varied during the last year from 198 to 495. There had been a very disquieting incident, known as the Hatry crisis; during the last twelve months the City of London had passed through one of the most difficult periods of its existence, and, naturally, all stocks must come into the fluctuations which had occurred. But one of the greatest difficulties which had to be contended with by those who dealt in the Association's stocks was that, although the Association was an important one, having a big capital, the information that they could give to the people who wanted to know about it was totally inadequate. There would have been a good many more rich shareholders who, he was sure, could have influenced the Association's business if the information which the Chairman had just given had been given before. Further, he submitted that a great deal of the information given by the Chairman could quite well have been given before the meeting. The shareholders came to the meeting and met the Directors once a year, and on this occasion the Chairman had made an interesting speech, but it was delivered fairly rapidly, and it was almost impossible to absorb or to write down the information contained in it. Therefore, if the Directors could see their way to give the shareholders a little more information before the meetings, so that the shareholders might have some idea of what the Chairman was going to talk about, it would be advantageous.

Mr. PRETTEJOHN reminded the Chairman of the statement he had made a year ago, to the effect that the Board would put the shares on to a £1 unit basis if the shareholders wished that to be done. At the present time the shares stood at a very high price, and many people who would like to obtain shares in the Association were unable to do so for that reason. If the shares could be brought down to a £1 unit basis it would be of very great benefit to the shareholders.

Mr. BLAKE asked whether, in the operations of the Association, low-temperature carbonization or high-temperature carbonization was used.

The CHAIRMAN, dealing with the questions that had been asked, said they were all very pleased to see Mr. Clark at the meeting and to hear the interesting remarks he had made.

With regard to the request for an accurate account of the amounts of the holdings of the Association in the various companies, there was no difficulty about doing that at all. In the case of the Belgian companies the Association held substantial amounts of the capital. As regards another point which Mr. Clark had very properly made, namely, that a complete statement should be issued with the report and accounts, in advance of the meeting, as to the Association's holdings in foreign companies, it was certainly the intention of the Board to do that next year. It had not been done this year because they had been rather harried and pressed for time, but there was every intention in the future of issuing a statement exactly on the lines of that issued by other important public utility companies.

With regard to the request by Mr. Prettejohn as to the issue of stock in £1 units, it was certainly true that at last year's meeting it was stated that if there were any general desire for the stock of the Association to be split into £1 units the Board would consider it, but it was a very strange thing that they had not received any request from any stockholder to this effect during the year. Therefore, it had been concluded that the body of the stockholders were indifferent in this matter; in consequence, the Board had taken no further proceedings. At the same time, he would remind the proprietors that they could go into the market any day and buy any small denomination of stock they wished.

The question of adopting low-temperature carbonization, mentioned by Mr. Blake, was one which the Board had constantly in view. They were following all the experiments in this connection with the utmost interest, and were being advised by highly competent technical advisers, who kept the Board continually informed as to the progress and development of their industry.

The report and accounts were put to the meeting and adopted unanimously.

DIVIDENDS.

The CHAIRMAN then moved:

"That a final ordinary dividend on the £1,076,000 old capital stock be paid on May 23, 1930, for the period ended March 31, 1930, to proprietors registered on May 8, 1930, at the rate of 12½ p.ct. (actual), *less* income-tax, making with the interim dividend at 5 p.ct. (actual), *less* income-tax, paid on Nov. 27, 1929, a dividend of 17½ p.ct."

Sir HENRY BIRCHENOUGH, Bt., K.C.M.G. (Deputy-Chairman), seconded the motion, which was carried unanimously.

Sir HENRY BIRCHENOUGH, Bt., K.C.M.G. (Deputy-Chairman), proposing the re-election of Colonel H. Le Roy-Lewis, C.B., C.M.G., D.S.O., as a Director of the Association, spoke of the valuable work the Chairman had done for the Association by his initiative and ability, and added that the Chairman's complete grasp of every detail of business had been made abundantly clear by his speech that afternoon. He therefore asked them unanimously to re-elect Colonel Le Roy-Lewis as a Director of the Association.

The Right Hon. Sir GUY FLEETWOOD WILSON, G.C.I.E., K.C.B., K.C.M.G., formally seconded the motion, which was carried unanimously.

Mr. H. G. PALMER moved the re-election as a Director of the Association of Mr. M. H. Tetley, M.I.Mech.E., who, he said, had done extremely useful work for the Association.

Sir GEORGE JESSEL, Bt., M.C., seconded, and the motion was carried unanimously.

On the motion of Mr. A. C. WHITMEE, seconded by Mr. J. E. LLOYD, Messrs. George A. Touche & Co., of Basildon House, 7-11, Moorgate Street, London, Chartered Accountants, were unanimously re-elected auditors for the ensuing year at a fee of 250 guineas.

The CHAIRMAN said that before the meeting closed there was one vote of thanks he wished to propose, and that was to the staff in this country and abroad. The Association always had been served by remarkably devoted and able servants, and were it not for their constant co-operation and their willing work, the Association would make very little headway. The Association was a very old one, dating back for more than a century, and there were traditional families in the employ of the Association in some cases for as much as three generations. He could assure the shareholders that it gave him the very greatest pleasure to recommend this proposal to them because of the valuable and loyal service rendered by the permanent staff both at home and abroad.

Sir HENRY BIRCHENOUGH, seconding the vote of thanks, said he had been a Director of the Association for something like thirty-one years, and during the whole of that period he had appreciated how much the Association was indebted to the staff for the progress it had made. The proprietors had every reason to be satisfied with the staff, and could have complete confidence in them.

The vote of thanks was carried with acclamation.

Mr. H. VERE SMITH thought it would be rather ungracious of the meeting to allow the proceedings to close without a vote of thanks to the Chairman for presiding at the meeting that day and for the extremely interesting and lucid address which he had given. The results of the year had been most satisfactory, and he had great pleasure in moving a cordial vote of thanks to the Board for their able management of the affairs of the Association.

Mr. WALTER NORTHOVER seconded, and the resolution was carried with enthusiasm.

Montevideo Gas and Dry Dock Company.

A Prosperous Year.

The Fifty-Eighth Ordinary General Meeting of the Montevideo Gas and Dry Dock Company was held at the Offices of the Company, 321, Dashwood House, Old Broad Street, E.C., on Tuesday, May 20—Mr. FRANK H. JONES, M.Inst.C.E., Chairman of Directors, presiding.

The LONDON MANAGER and SECRETARY (Mr. Henry Kearns) read the notice convening the meeting, together with the Auditors' report for the year ended Dec. 31 last. The minutes of the last annual general meeting were taken as read and confirmed.

THE CHAIRMAN'S ADDRESS.

The CHAIRMAN said: As mentioned to you last year, we then proposed to issue at par the unissued ordinary shares amounting to £58,080. This was duly carried out, and most of our stockholders took up the allotment of £1 for every £10 held; but owing to there being several deceased accounts, the Trustees for which were unable to add to their holdings, and fractions arising from the division, we gave the stockholders the opportunity of applying for any excess number of shares. These were so considerably over-applied for that we were only able to allot about 8½ p.ct. to the largest applianets; but applicants up to £25 were allotted in full.

Our gas sales show an increase of no less than 360 p.ct. compared with the year 1906, when the capital expenditure was £543,150, and it is to-day £749,515, including the addition of £50,240—an increase of only 38 p.ct. In the meantime most of the old plant has been superseded, and replaced by up-to-date and more scientific plant; but further extensions of plant will be required within the next few years.

The reserve account now stands at £140,000, and the pension fund at £12,000.

The amount required for the redemption of the 6 p.ct. debenture stock has also been provided out of the profits, and now amounts to £18,169, which is in advance of the amount required to redeem it in the 15 years for which the stock was issued. Our investments show an increase of £20,833, while bills receivable appear at £20,813. £15,000 of this has since become due for payment and has been collected, and cash shows an increase of £9083, giving us, you will agree, a very sound financial position.

Our sales of gas show an increase of 4·25 p.ct., notwithstanding that the meter readings were taken 1 to 10 days earlier during the year under review. Had the same number of days been taken into account in 1929 the sales, we estimate, would have shown an increase of 6½ p.ct.

During last year our General Manager, Mr. Whyte, visited England, and made himself familiar in a practical way with the latest methods of gas manufacture and modern plant, and it is largely due to his capable management that the satisfactory position of the Company has been attained, and to his readiness at all times to support and put into operation the policy of the Board.

I now beg to move:

> That the report and accounts now presented be received and adopted, and that a dividend be and the same is hereby declared on the ordinary stock of the Company for the half-year ended Dec. 31, 1929, of 4 p.ct., free of income-tax, payable on May 21, and making, with the interim dividend previously paid, 7 p.ct. free of income-tax for the year 1929.

Sir EDGAR HORNE seconded the resolution for the adoption of the report, and, no question being raised, it was put to the meeting and carried unanimously.

RE-ELECTION OF DIRECTOR AND AUDITORS.

On the proposition of the CHAIRMAN, seconded by Mr. E. B. READ, Mr. C. C. Mallet was unanimously re-elected a Director.

Mr. J. E. WIMSHURST proposed, and Mr. GEO. BELL seconded, the re-election of the Auditors—Sir Laurence Halsey and Mr. William C. Sneath—which was carried.

VOTE OF THANKS TO STAFF.

The CHAIRMAN then paid tribute to the excellent work of the Company's staff, both in London and Montevideo. It was not an easy Company to manage, he said, for there were a lot of little difficulties which were not easily overcome. He made special mention of the valuable services of Mr. Kearns and Mr. Whyte. He knew most of the staff which represented the Company, and he could say that they were served by a very able and efficient lot of men; and as to their loyalty he had no doubt. He, therefore, proposed that the thanks of the meeting be given to the whole of the staff of the Company for their services during the past year.

Mr. MALLET, seconding the vote of thanks, remarked that they were extremely lucky to have such able men in their employ. He himself had been out to see what Mr. Whyte did, and he had great admiration for the way in which Mr. Kearns carried out the work in London.

Mr. W. W. PARRISH, supporting the vote, said that he had recently paid a visit to Montevideo, and had never seen any staff to equal theirs for enthusiasm and keenness.

Mr. KEARNS said he would like to thank them very much for the very appreciative remarks they had passed about the staff in Montevideo and London. He was sure Mr. Whyte would feel very gratified, as they did here, at the very cordial vote of thanks they had passed. He was sure they would all continue to do their best for the Company.

This concluded the business of the ordinary general meeting.

Extraordinary General Meeting.

An Extraordinary General Meeting immediately followed, at which the resolutions (set out in the "JOURNAL" for April 30, p. 251) were proposed.

The CHAIRMAN, in drawing attention to one or two points in connection with the resolutions, said: In compliance with the Companies Act, 1929, we have to call an extraordinary general meeting to pass the resolutions embodied in the circular sent to the ordinary stockholders on April 28.

The first resolution deals with the adoption of new Articles of Association; they were revised in the year 1919; but the new Act has to a large extent rendered them out of date, and in order that our Articles shall be in accord with that Act, we recommend that the revised Articles be adopted.

The next resolution deals with the increase of the capital of the Company, and I need not do more than propose:

> That the capital of the Company be and it is hereby increased from £600,000 to £675,000 by the creation of 75,000 ordinary shares of £1 each ranking *pari passu* in all respects with the existing ordinary stock of the Company for £600,000.

The last resolution is one that I think will appeal to you, and deals with the capital bonus of 12½ p.ct. It is that the sum of

£75,000, part of the undivided profits standing to the credit of the reserve of the Company, be capitalized and applied in making payment in full at par for 75,000 ordinary shares of £1 each of the Company, and that such 75,000 fully paid ordinary shares be converted into ordinary stock for £75,000, and that such stock be distributed among the holders of the issued ordinary stock of the Company at the closing of the books of the Company on May 7, 1930, at the rate of £1 stock for every £8 issued ordinary stock then held by them respectively.

Sir EDGAR HORNE seconded the resolutions, which were carried unanimously.

The meeting closed with the passing of a very hearty vote of thanks to the Chairman on the proposition of Mr. PARRISH, seconded by Mr. BELL, to which Mr. JONES briefly replied.

Cape Town and District Gas Light and Coke Company, Ltd.

Annual General Meeting.

The Fortieth Ordinary General Meeting of the shareholders of the Company was held at the Company's Offices, at 38, Grosvenor Gardens, S.W. 1, on Wednesday, May 21, at 12.30 p.m. Mr. C. W. LILLEY (Chairman of the Company) presided.

Mr. R. W. BLACKBURN (Managing Director and Secretary) read the notice convening the meeting and the Auditors' report on the balance-sheet.

CHAIRMAN'S ADDRESS.

The CHAIRMAN said: The next business on the agenda is the resolution for the adoption of the Directors' report and the accounts for the year ended Dec. 31, 1929, which this year it falls to me to move. I presume that the shareholders, as usual, will be ready to take the report and accounts as read, and I propose to make some comments on particular items in the accounts before making a general review of the business of the Company. You will have gathered that the year we are dealing with—the year 1929—has been one of very substantial progress so far as the business of the Company is concerned. I think it is a matter for some congratulation that we have achieved that result in a year which has not been distinguished on the whole for good trade. Those of you who read the reports of political speeches will not have failed to observe that there has been considerable insistence, particularly by apologists for the Government of the day, any particular Government, on the bad trade which has been prevalent throughout the world at large. Ordinary business in Cape Town has not been good during the year; trade as a whole has not been good; and in those circumstances I think it is a matter for some congratulation that the results which you see in the accounts have been achieved.

INCREASE IN GAS SALES.

I do not wish to make any very detailed examination of the accounts, but there are just a few items to which I should like to call your attention. We will take the revenue account first, and I should like to make some comment upon some of the items on the expenditure side of that account. You will have observed that there has been an increase in the gas sales for the year, amounting in money to £5754. That is, of course, a very substantial increase; it represents an increased output of about 13 million c.ft. of gas, and it is obvious that this large increase must be reflected in the expenditure side of the revenue account. The first item to which I wish to draw attention, therefore, is the cost of manufacture and distribution of gas, which, of course, is a very large item, and includes the results of a number of accounts. That item of cost of manufacture and distribution is, in fact, about £1600 in excess of the figure for the previous year. There was carbonized during the year 1929 about 500 tons more coal than was carbonized in 1928. We do not get coal for nothing, and, therefore, of course, costs of manufacture are necessarily increased in that respect. But the increase is not merely due to the cost of the extra amount of coal which has been carbonized.

The next item, that of repairs and maintenance of works, plant, mains, &c., is a little over £1000 above the figure for the previous year; thus, it has not increased to any very great extent, and that there has been an increase at all in this item is really due to the fact that some special repairs were carried out during the year and charged in the year's account. There is nothing very material in that increase. There has also been an increase in the next item, which is rents, rates, and taxes. Inasmuch as this item includes taxes it will not surprise you to learn that there is an increase, because it is not only in this country that taxation has been increased. Last year's Budget in South Africa, I believe, did not balance; therefore, new taxes became more than a slight possibility on the horizon, and our Auditors advised us that we should bring into that account a further sum to meet the expected increased taxation. That taxation was actually imposed before the accounts were dealt with on this side, so that the advice which we received from our Auditors in that respect was very good advice. That item is actually up by £1429.

Another item in which there has been an increase is that of salaries and wages, the increase being about £1200 there. In a sense this increase is misleading, because we have pursued for some years a policy of distributing salaries and wages as far as we possibly can over the different accounts to which we think they ought to be allotted, and in the process of doing this we have charged to salaries and wages certain amounts which have previously been charged in the item of general and incidental expenses. Therefore, the increase is not so much real as apparent; the actual increase in our expenditure under that heading is very small indeed, but the amount charged to the salary and wages account is larger by £1200, and there has been a reduction in the figure for general and incidental expenses. The actual reduction in the latter account is rather less than £500, as it turns out, but there would have been a reduction of over £1000 if we had had available in 1929 the credit of about £600 which we had available in the previous year. We had certain rebates in 1928 which we did not get in 1929, and, therefore, the amount of the general and incidental expenses is less than in 1928 by only £459.

The next item which is worthy of comment is that of interest, discounts, allowances, &c.; this amounts to £1048, and is about the usual figure. The interest on the loans is higher, and certain freight rebates which we obtained during 1928 were discontinued during 1929. The 1928 position was rather advantageous for us, because in that year there was a freight war going on between the steamship companies in the Cape trade, and freight rates were cut down a good deal, so that we obtained an advantage in that connection. Peace was declared between the shipping companies in 1929, however, and we suffered the disadvantages which are sometimes attendant upon the declaration of peace between two belligerents—we lost the advantage which accrues to neutrals when belligerents are at war; and this really accounts for the increase in that item as compared with the figure for 1928. Actually, the figure is about the same as in normal years.

EXTREMELY SATISFACTORY WORKING.

That is all I need say about the expenditure side of the accounts. I think you will regard the other side as being very satisfactory. As I have said, the receipts from gas sales are up by £5754; and this is a particularly satisfactory figure, because during the whole of 1929 we were subject to the decrease of the price of gas which we made effective as from July 1, 1928. We were supplying gas for only half of the year 1928 at the lower figure, but were supplying during the whole of 1929 at the lower figure. To have achieved an increased revenue from the sales of gas amounting to £5754 in those circumstances is a result which I think may be regarded as extremely satisfactory. The receipts from sales of residuals and sales of fittings resulted in an increase of something over £1000. Thus there is an increase in the income this year of about £6800.

We have taken the balance to the profit and loss account, and I do not need to deal with that account, because all the items in it speak for themselves. The result is a transfer to the balance-sheet of the balance from the profit and loss account of £9859 9s. 2d.; this is about £1650 more than we transferred to the balance-sheet last year.

INCREASED DIVIDENDS.

There is very little to say about any particular item in the balance-sheet, but I do wish to make some general observations, and to refer, as a preliminary, to one or two items. You will observe that the general reserve has increased by £4000, bringing the total up to £78,000, and the reserve for plant renewals is brought up to £25,000. Another figure on the liabilities side of the balance-sheet is that for loans, which is increased by £8000; but I will deal with that figure a little later. On the assets side of the balance-sheet, there has been added a capital expenditure of £10,562; this figure is £5800 less than it was in 1928. The result is that we now have a figure of £9859 to deal with, and we have this year recommended to the shareholders that the dividends should be increased by 1 p.ct.—from 7 to 8 p.ct.—and it is in relation to this increase of dividend that I wish to make a few observations. During the last five years there has been an increase in the sales of gas amounting to 53 million c.ft. It is obvious that we cannot secure an increase of this sort without extending our plant, and without very considerable capital expenditure. During this period the paid-up capital of the Company has remained stationary. The capital expenditure during the five years has been about £50,000. How has that been financed? Well, the short-term loans have been increased during that period by £13,000, and £13,000 only. The result of this is, as you see, that the Company has financed its capital requirements out of its earnings to the extent of £37,000 during the five years.

Of course, this has its reflection in the reserve accounts. The general reserve during the five-year period has been increased by £28,000, and the plant reserve has been created to the extent of £25,000. Those results, of course, have been achieved only by very great diligence on the part of the staffs on both sides, and by very careful organization, which has taken place to a large extent from this side, the work being done on the other side. This organization would have been quite useless unless the work had been done very efficiently and very loyally by our Cape Town staff. Another factor which has led to the results achieved has been the adoption by the Directors here of a settled policy of ascertaining as far as they possibly can their commitments, their obligations, their needs of useful expenditure over a considerable period of time, and so distributing the work to be done. From time to time, when I have attended general meetings—and I have attended a good many during these few years—I have heard, not criticisms, but questions addressed to the Board as to whether they could not properly increase the dividends. Well, I always feel very much sympathy for the shareholders who take that view. When a company has to finance its capital requirements out of its resources it is very undesirable to deplete its resources by paying large dividends, and the Company has thought it desirable during those years, therefore, to conserve its money as much as it

possibly could. But one cannot expect shareholders for all time to see considerable profits earned without taking some rather more substantial share in them, and, therefore, we thought it right, as we have been able to meet the lowering of the price of gas without any loss to our revenue—on the contrary, there has been an increase in our revenue—to recommend the shareholders this year to allow a dividend of 8 p.ct. to be declared. The difference is not very great, but I hope it will be some satisfaction to the shareholders to get it.

We have done this because we think, as the result of the review of the Company's progress during the past five years, that there has been steady progress, and we find also that during the current year, up to the present time, our sales of gas continue to expand. This review does appear to us to show that some increase of the capital of the Company is justified. Of course, a very large amount has been expended under capital account in respect of which there has been no capital issued; and when the appropriate time arrives—of course, we must have regard to general financial conditions and extraneous circumstances generally in coming to a conclusion as to when that time has arrived—an increase in the capital of the Company is warranted. An increase in the capital, of course, would enable development to be continued without so large a drain on the cash which is available for distribution as dividends to the shareholders. I hope the shareholders generally will keep these observations in mind, because if it is possible to issue fresh capital it does appear, to the Directors at all events, that it would be a very good investment for the shareholders who choose to participate in it. We are not intending to do it at the moment, but it is a thing which I hope the shareholders generally will keep in mind.

Those are the observations I have to make in presenting the report and accounts to you. I move that the report and accounts be adopted, and will ask Mr. Blackburn to second that resolution.

Details of Working.

Mr. Blackburn: In seconding this resolution it has been usual at our past meetings for me to comment upon the details of working for the year. The tonnage of coal carbonized has increased, due to the larger output of gas, as the Chairman has explained. The cost per ton in 1929 was practically the same as in the previous year, and the make of gas per ton of coal was also about equal to that of the previous year. The volume of gas sold increased very satisfactorily, bearing in mind particularly the excellent increase during the previous year. The details of that increase are, on Ordinary Meter Account, 1·20 p.ct.; on Industrial and Special Rate Account, 3·30 p.ct.; and on Slot Meter Account, 2·4 p.ct. This makes a total of 6·90 p.ct., as against 8·70 p.ct. in the previous year. The increase in the actual number of c.ft. sold is, as the Chairman has pointed out, over 13 millions. The largest increase of sales was on Special Rate Account, principally for the requirements of industry. We have made concessions in price for this special purpose, and this undoubtedly has stimulated consumption, and I think I may say that the prospects of further increases in the consumption of gas for industrial purposes are very encouraging. We have laid new mains to the extent of 3 miles, the total mileage of mains now in operation being 137. The number of consumers increased by 297, the greater proportion being on Slot Meter Account. The number of gas-consuming appliances installed during the year is 1008, which is made up of 250 cookers, 369 geysers, and 389 grillers, fires, &c. During the year the new showroom at Claremont, which was referred to at our meeting last year, has been completed and opened, and we have inaugurated there a series of demonstrations of gas cooking and lectures on the various uses of gas, all of which have proved very popular. At the same time, we are continuing the lectures and demonstrations at our Cape Town showrooms.

I think that is all I need say with regard to the actual working for the year, but I should like to say a few words, if you will permit me, on the Chairman's review of the main features of the five years' working. He has mentioned that during that period the sales of gas have been increased by 53 million c.ft.; this is equivalent to 34·4 p.ct., or an average rate of nearly 7 p.ct. per annum. You gentlemen who are conversant with the gas industry will admit, I think, that this, if it is not an extraordinary increase, is at any rate a very satisfactory one. We have laid during that period 16 miles of new mains, we have added 1155 new consumers, and have installed over 4000 new gas-consuming appliances—this figure including 1700 cookers, 1500 geysers, and some 800 grillers, fires, hotplates, &c.

There is another point I should like to mention in regard to the review of the five years' working. The Company's working is, of course, affected by the legislative enactments under which it operates. Sometimes it is a considerable source of anxiety to comply with those statutory requirements, but I am very pleased to be able to report to you that all our statutory obligations during that period have been very fully met. The Chairman has remarked that general conditions of trade in Cape Town are not good, due to a world-wide depression, but against that we have in Cape Town a very large field indeed for the expansion of gas business, assuming that the necessary outlay to enable us to deal with the extensions is forthcoming. The returns to date show that we have had a very satisfactory increase in gas sales for the current year, and I hope that when we come to compare this year's results with the figures you now have before you we shall find that they will be as favourable.

I have very much pleasure in seconding the resolution for the adoption of the report and accounts.

The Chairman: Before putting the resolution to the meeting I will invite any shareholders to ask any questions.

Mr. Edward W. C. Whittaker, J.P.: I should like to ask one or two questions. In the first place, there is a rather disquieting paragraph in the Auditors' report to the effect that, apart from the expenditure on repairs, and so forth, no provision has been made for depreciation. This makes one feel a little uncomfortable, because I have a very lively recollection that during your respected father's Chairmanship, Mr. Chairman, the shareholders suffered for many years through that policy—at least, I think it was through that policy, or at any rate through some policy or other; in any case, not sufficient foresight had been displayed in maintaining the plant and the whole business at that time. Evidently the Auditors feel a little uneasy about it, because they throw the whole responsibility back upon the Board. They do not take any themselves, and I should like to have some assurance from you, Sir, other than that which we have in the printed report, that you have made, and intend to make in the future, sufficient provision for the depreciation of the plant. Nothing lasts for ever, and if provision is not made for depreciation we shall have to suffer hereafter.

There is another question, which is quite a minor one. I should like to know what you are paying for coal and where you are getting it from. Are you obtaining it in South Africa?

The Chairman: Yes, entirely.

Mr. Whittaker: You are not importing any?

The Chairman: No.

Mr. Whittaker: Then where do the freight charges come in?

The Chairman: Those are the freight charges on the large quantities of goods which we send to South Africa.

Mr. Whittaker: What kind of goods?

The Chairman: All kinds—gas cookers, meters, mains, pipes, and so on. The cost of freight constitutes a very large item.

Mr. Whittaker: I thought possibly it was a question of coal, and if that were the case it would require a good deal of consideration.

Mr. Nichols: As you know, the programme I have urged upon the Board has been that when they saw their way to do so they should consider the shareholders; I never urged that they should do so unless they felt that they could do it with safety, and I cannot help feeling that they have presented on this occasion a very strong balance-sheet. It is eight years ago since the dividend has been increased, and during that period the reserves have nearly doubled, and the gas sales have increased tremendously, as has also the number of consumers. I do feel that you as a Board have gone into this matter very carefully and that you are perfectly justified in recommending this extra 1 p.ct., and I think we ought to congratulate you and ourselves upon your proposal.

The Chairman: To deal first with the question of coal, Mr. Whittaker, who has been a shareholder for a very long time, will no doubt remember that at one time we obtained our coal from this country. It has long been impossible economically to ship coal to South Africa from this country for the purpose of making gas, however, and for many years now we have been obtaining all our coal from local sources. The freight charges which still continue are necessarily very large, unfortunately; practically all the goods we use and which we do not manufacture ourselves are obtained from this country, and freight charges for gas mains and things of that kind are, of course, very large.

With regard to the plant, you may, of course, when dealing with this problem, either write down the value of your plant by way of depreciation or spend the appropriate sums in repairing and maintaining the plant. We have spent very large sums on repairs and maintenance. We have been particular to treat as repairs and maintenance all the repairs and renewals which we can properly treat as such. There is not a doubt that at present the works are in a very highly efficient condition so far as repairs and maintenance go, and not only should we not think it right to charge depreciation while they are being fully maintained, but Mr. Whittaker will probably appreciate that if we attempt to do so the Inland Revenue Authorities would have something to say about it. For those reasons we do not think it would be at all appropriate to write down the value of assets upon which we are spending very large sums in repairing them and maintaining them in the highest possible state of efficiency. The recollection of Mr. Whittaker as to the factors which brought about the state of affairs which existed for so long some twenty years ago is not really accurate. At that time there was no loss suffered by the Company by reason of inefficiency or non-maintenance of its plant. The causes which led to the condition of affairs which did exist were quite different, and were necessarily the subject of very anxious consideration by the Directors. I was a member of the Board at that time. On this matter the Directors now are quite satisfied that their policy is the proper one.

I am very grateful to Mr. Nichols for the observations he has made. It is quite true that when he has suggested to us that we ought to increase the dividends he has always left it quite explicitly to our judgment as to whether or not we should do it. We did not do it earlier, and I dare say he was disappointed, but I am sure he appreciates that we have taken this proper opportunity of doing it now.

The resolution for the adoption of the report and accounts was then put to the meeting and carried unanimously.

Re-Election of Retiring Director.

The Chairman: The next business is to propose the re-election of the retiring Director, Mr. W. J. Bradford. Mr. Bradford has been with us for many years, and it is my duty—it is a very pleasant duty for me, as Chairman, to perform—to propose his re-election as a Director of the Company.

Mr. H. R. Savory: I have very much pleasure in seconding the re-election of my colleague, Mr. Bradford. He has been a Director for some considerable time, and has proved himself to be most punctual and efficient in every possible way.

The resolution was carried unanimously.

Mr. W. J. Bradford: I am extremely obliged to the shareholders for their vote of confidence, and also to you, Mr. Chairman, and Mr. Savory for your remarks.

Re-Appointment of Auditors.

The Chairman: The next business is the re-appointment of the Auditors. Will a shareholder be so good as to move the necessary resolution?

Mr. Edward W. C. Whittaker: I have very much pleasure in proposing that Messrs. Kemp, Chatteris, Nichols, Sendell, & Co. be re-elected, at the same fee as previously. This firm is a very well-

known firm of accountants; from their reports I think one can see that they give very great care to our finances, and I think we shall be quite safe in their hands.

Mr. HAYES seconded.

The resolution was carried unanimously.

VOTE OF THANKS TO THE BOARD AND OFFICERS AND STAFF.

Mr. HAYES: I should like to take this opportunity of moving a vote of thanks to our Chairman for his address and to Mr. Blackburn for the details of the Company's workings which he has put before us. We are glad to have a dividend of 8 p.ct., and I congratulate you, gentlemen, on showing such an excellent balance-sheet. I should also like to express on behalf of the shareholders our thanks to the officers and the staff.

Mr. S. G. TUNGAY seconded.

The vote of thanks was carried with acclamation.

The CHAIRMAN, responding, said: I am very much obliged to you all. I am obliged to Mr. Hayes for the terms in which he proposed the vote of thanks, and to you all for your kind reception.

The meeting then closed.

Institution of Gas Engineers' Examinations.

The following questions were set in the examinations in Gas Engineering and Gas Supply, which were held on May 3 and May 10 respectively, under the Education Scheme of the Institution of Gas Engineers.

GAS ENGINEERING.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches should be made to obviate long and involved statements.

The general neatness of the papers, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(*Eight Questions set; six only to be attempted.*)

1. Describe how a modern horizontal retort bench is constructed, and state what materials are used in the various parts.

2. Describe one form of hydraulic main and the method of dealing with condensate deposited there.

3. (*a*) Describe the method of operating a carburetted water gas plant.

(*b*) Explain the principal reactions which take place in it, and give the approximate working temperatures.

4. (*a*) Describe one form of mechanical scrubber.

(*b*) Explain how the elimination of ammonia from the gas is effected.

5. (*a*) Describe modern method of using oxide of iron for the elimination of sulphuretted hydrogen from gas.

(*b*) Explain the principal reactions which take place.

6. (*a*) What is the function of a station governor?

(*b*) Describe its construction and action.

7. (*a*) Describe the construction of a pressure register.

(*b*) Explain the relation between "inches water pressure" and "lbs. per sq. in."

8. (*a*) Describe the sampling and testing of gas in the waste flue of a retort bench.

(*b*) Give the composition you would expect to find.

HIGHER GRADE.

Part I., from 2 to 5 p.m.

Some of the questions in this paper call for sketches. Simple line drawings only are required, provided they are clear and indicate the principles involved. Sketches should be roughly to scale.

(*Five Questions set; four only to be attempted.*)

1. Compare generally the characteristics of gas coals from the following areas:

(*a*) Derbyshire,
(*b*) South Yorkshire,
(*c*) Durham.

What differences would you expect to find in the production and quality of gas and residuals obtained from these coals?

2. Sketch any type of exhauster with which you are familiar, and describe its action.

What precautions would you take to keep the exhauster in efficient working order?

3. You are required to design condensing plant to cool 5 million c.ft. of gas per diem manufactured in continuous vertical retorts. The gas is manufactured from a good South Yorkshire coal and has a calorific value of 500 B.Th.U. per c.ft., approximately 77 therms being obtained per ton of coal carbonized.

(*a*) Sketch a plant suitable for this purpose, and explain how you would decide on the number and size of condensers required.
(*b*) Give your reasons for choosing the particular type of condensing plant you adopt.
(*c*) What would you expect to be the temperature of the gas in the foul main, and to what temperature would you propose to cool it at the outlet of your condensing plant?

4. Sketch a waterless gasholder, and explain its action.

What precautions are necessary to ensure safe working of this holder?

5. (*a*) Describe the process with which you are most familiar for the removal of sulphuretted hydrogen from gas, giving equations representing the reactions which take place.

(*b*) How would you test a sample of spent oxide for moisture and sulphur?

Part II., from 6 to 9 p.m.

Some of the questions in this paper call for sketches. Simple line drawings only are required, provided they are clear and indicate the principles involved. Sketches should be roughly to scale.

(*Five Questions set; four only to be attempted.*)

1. Sketch any type of horizontal retort stoking machinery, and describe its method of working.

What are the advantages and disadvantages of the machine selected?

What points in this machine require particular attention in order to maintain it in efficient working order?

2. How would you prepare coke as it leaves a retort house for the domestic market?

Give a simple diagrammatic sketch of the plant you would use, and, if you decide to grade the coke, state into what sizes you would do so.

3. Explain the reactions which take place in the manufacture of carburetted water gas.

If 500 B.Th.U. gas is required, what points would you watch particularly in operating the plant in order to obtain maximum economy?

How much oil would you expect to use per 1000 c.ft. of gas made?

4. Sketch a plant used for the manufacture of dry neutral sulphate of ammonia, and describe the method of working this plant.

How much sulphate of ammonia would you expect to obtain per ton of coal carbonized?

5. At what pressure or vacuum do you consider gas should enter the ascension pipe of a horizontal retort, or, alternatively, the off-take pipe of a continuous vertical retort?

Give the reasons which lead you to form your opinion.

Sketch an apparatus used to maintain gas at the required pressure or vacuum, and describe its method of working.

State where you would instal this apparatus.

DIPLOMA.

Part I., from 2 to 5 p.m.

(*Five Questions set; four only to be attempted.*)

1. If you were laying out a works of 3 million c.ft. daily capacity on six acres of land adjacent to a railway line, show by means of diagrammatic sketches your proposed lay-out, and describe the type of gas manufacturing plant you would instal, the method of coal and coke handling, and other transport arrangements.

2. Describe and give sketches of a modern setting of intermittent vertical retorts.

Compare and contrast the system of carbonization with continuous vertical retorts and intermittent vertical retorts.

3. Describe and sketch the heating system of a modern coke oven suitable for a gas-works, giving the principal dimensions and throughput of coal.

Compare the quantity and quality of gas and residuals from coke ovens with the types of carbonizing plant more generally in use in gas-works; give your opinion as to the suitability of coke ovens for the more general adoption by gas companies.

4. What are the desirable properties of a good domestic coke? State in what respects high-temperature and low-temperature cokes differ. Give some account of the significance of blending coals, and carbonizing conditions; and coke treatment in the domestic coke problem.

5. Describe a method for computing the thermal yields from oil and coke in carburetted water gas manufacture, and illustrate this by means of an example of good modern working.

It has been suggested that a suitable outlet for coal tar, coal tar creosote, and low-temperature tar might be found by carburetting these products in a carburetted water gas plant; discuss this subject, stating the carburetting efficiency and operating difficulties one would expect in each case.

DIPLOMA.

Part II., from 6 to 9 p.m.

(*Five Questions set; four only to be attempted.*)

6. Describe, with sketches, the type and lay-out of a new purifying plant you would adopt with a view to reducing purifying costs to a minimum.

Describe the method of working the purifiers which makes for the greatest economy.

7. To what extent could a modern works be provided with power generated from waste heat from gas manufacture?

Describe briefly the works in which such economy could be best effected, referring to the type of carbonizing plant and the proportion of carburetted water gas suggested. State the power that could be produced on the one hand compared with the power consumption and losses in a modern works on the other, and describe what is, in your opinion, the most efficient method of power distribution.

8. Describe in detail a process for the direct recovery of ammonia, and state, with reasons, the extent to which you consider the process suitable for gas-works practice.

Describe a method of removing the phenols from effluent liquor from a sulphate plant.

9. Describe the various methods in use of heat insulation and lagging on a gas-works, and refer briefly to the theoretical aspects of this matter.

State parts of any typical carbonizing plant, horizontal and vertical, you would insulate and describe the materials suitable for each part and the precautions to be observed.

10. Give a description and sketch of the gas measuring appliance which would recommend itself to you, to take the place of the drum type station meter.

Refer particularly to the accuracy of each type, and state in what respects it is better than the station meter, also in what respects a station meter is to be preferred.

GAS SUPPLY.

ORDINARY GRADE.

From 2 to 5 p.m.

Sketches should be made to obviate long and involved statements.

The general neatness of the papers, including that of the sketches, and also lucidity of expression, will be taken into consideration in assessing marks.

(*Eight Questions set; six only to be attempted.*)

1. Make dimensioned sketches of various cast-iron pipe joints with which you are familiar. Assume the pipe has an internal diameter of 6 in.

Explain how the joints are made in practice, and discuss their relative merits.

2. Sketch the component parts of a good lighting burner, and state the materials used.

Show, by means of a sketch, the truth of the law of "inverse squares" as applied to lighting.

3. Gas cookers with bottom flue outlets are increasingly used. Suggest reasons for this.

4. How is silence, correct aeration of flames, and correct rate of gas consumption ensured in a modern gas fire? Give sketches.

5. An iron tank (unlagged), 3 ft. long, 2 ft. wide, by 2 ft. 6 in. deep, is filled with water to a height of 2 ft. Calculate the probable rate of gas consumption required to heat the water from 50° to 200° Fahr. in one hour. What rate would you estimate as sufficient to maintain the higher temperature?

6. What are the advantages of thermostatic control of water heaters? Make a graph showing how the rate of gas consumption in a water heater with which you are familiar is effected by the action of the thermostat.

7. What is meant by a "low pressure" or "natural draught" system of heating for furnaces?

Give a sketch and brief description of a furnace heated by this method, stating what temperatures are attainable with the furnace described.

8. Describe, from a chemical point of view, the difference between complete and incomplete combustion of town gas.

HIGHER GRADE.

Part I., from 2 to 5 p.m.

Some of the questions in this paper call for sketches. Simple line drawings only are required, provided they are clear and indicate the principles involved. Sketches should be roughly to scale.

(*Six Questions set; four only to be attempted.*)

1. A 24-in. main (AD) three miles long has a branch at B (one mile from A) and another at C (two miles from A). The pressures at A, B, C, and D are 9 in., 6 in., 4 in., and 3 in. respectively as measured by water gauge.

Using Pole's formula, calculate the volume of gas in c.ft. per hour leaving the main by the branches at B and C—(*a*) if the main were level from end to end, and (*b*) if the main were to rise uniformly at the rate of 50 ft. per mile.

The specific gravities of gas and water to be taken as 0·46 and 800 as compared with air.

2. What do you understand by the expressions "high pressure" and "low pressure" as applied to gas distribution?

What factors would you take into account in determining the most economical combination of initial pressure and size of main to supply a developing district, and explain how these factors are related by reference to a specific problem of your own choosing.

3. Sketch and describe some form of recording gravitometer for gas. State your views regarding the practical significance of the specific gravity of gas from the points of view of distribution and utilization.

4. What methods are available for measuring gas other than the usual "dry" or "wet" meters?

Explain the scientific principles on which any one of these methods is based.

5. Make a cross-section, and describe the essential features, of a pressure governor with compensated valves. Explain the purpose of compensation.

In what circumstances would you instal a pressure governor—

(*a*) on the outlet of a consumer's meter?

(*b*) at the inlet of individual gas appliances?

6. Give your general recommendations for the lighting of two miles of an arterial road, 120 ft. wide, with up and down tracks and with narrow grass strip along the centre of the road.

Give information on type and candle power of lamps, polar curve of light distribution, spacing, height, and method of control.

HIGHER GRADE.

Part II., from 6 to 9 p.m.

Some of the questions on this paper call for sketches. Simple line drawings only are required, provided they are clear and indicate the principles involved. Sketches should be roughly to scale.

(*Six Questions set; four only to be attempted.*)

1. Discuss from scientific and practical points of view the pros and cons of the various developments of gas fire radiants during recent years, having particular regard to the form and heat emission properties of the radiant.

2. Compare the relative merits of "instantaneous" multi-point gas water heaters and the lagged "storage" heaters that have recently been put on the market.

What laboratory tests would you make in order to compare the relative cost in practice of using the two types of water heaters?

Describe the circumstances which specially favour the use of each type.

3. State the principles of submerged combustion, and discuss the potentialities of its practical application.

4. Explain the following terms in relation to furnace design:

Pressures of gas and air,
Pyrometry,
Regeneration,
Automatic control,
Oxidizing and reducing atmospheres.

5. By reference to work with which you have been associated explain scientifically the meaning and show the practical application of any four of the following terms:

(*a*) Boyle's Law,
(*b*) Thermal efficiency,
(*c*) Temporary hardness of water,
(*d*) Electrolysis and fusion,
(*e*) Thermal insulation,
(*f*) Complete and incomplete combustion,
(*g*) Polar curves,
(*h*) Condensation.

6. State the relative merits of gas, electricity, and oil for cooking, water heating, and room heating, having regard both to costs and to other considerations you consider important.

Welsbach Light Company.

Mr. Justice Maugham, in the Chancery Division on Tuesday, heard the petition of the Imperial Chemical Industries, Ltd., for leave to give notice to certain discontented shareholders of the Welsbach Light Company, Ltd., that their shares would be acquired by the petitioning concern.

There was no appearance of any opposing shareholder, and Mr. Lionel Cohen, K.C., said the notice affected 1131 shares held by 184 persons, 100 of whom could not be found. The offer made was ten ordinary and one deferred shares in Imperial Chemicals for every twenty shares in the Welsbach Company. Ninety per cent. of the shareholders had accepted that offer.

His Lordship, holding that the offer was a fair one, granted the petition.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDER.

Croydon Gas Company.

To authorize and provide for the transfer to the Croydon Gas Company of the undertakings of the East Surrey Gas Company and of the Oxted and Limpsfield Gas Company, Ltd.

SPECIAL ORDERS.

Clacton Urban District Council.

To extend the limits for the supply of gas so as to include the parishes of Little Holland and St. Osyth; to authorize the Council to use scheduled lands for gas purposes; to confirm an agreement between the Council and the Tendring Hundred Water-Works Company for the laying by the Council and the Company of inter-connecting gas mains, and for the supply by the Council to the Company of gas in bulk for use and distribution within the limits for the time being of the Company for the supply of gas or for any other object for which the Company may require gas; and for other purposes.

Heathfield and Waldron.

To provide for the transfer to the District Gas Company (Heathfield), Ltd., of the undertaking authorized by the Heathfield and Waldron Gas Order, 1915, and for other purposes.

Hessle Gas Company.

To enable the Company to raise additional capital, &c.

St. Helens Corporation.

To authorize the use of scheduled land for gas purposes, and to make further provisions in regard to the supply of gas.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. May 23.	Rise or Fall on Week.	Transactions Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 6	5	5	Aldershot 5 p.c. max. C	73–78	..	..
522,992	,,	,,	4	4	Do. 4 p.c. Pref.	70–73	..	71½–72
1,551,868	,,	Apl. 3	7½	7½	Alliance & Dublin Ord.	93–96	..	95–95½
374,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	60–63	..	..
522,655	,,	Mar. 6	7	7	Barnet Ord. 7 p.c.	109–112	..	..
300,000	1	Apl. 24	1/4½	1/7½	Bombay, Ltd.	16.6 - 18.6	..	17/-
174,500	10	Mar. 6	9	9	Bournemouth 5 p.c.	14–15	..	..
500,050	10	,,	7	7	Do. 5 & 7 p.c.	12½–12¾	..	..
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10½–11½	..	..
50,000	Stk.	Dec. 19	3	3	Do. 3 p.c. Deb.	55–58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74–77	..	..
357,900	,,	Mar. 20	7½	7½	Brighton & Hove 6 p.c. Con	113–116	..	..
371,880	,,	,,	6¼	6¼	Do. 5 p.c. Con	100–103	..	102½–103
1,287,500	,,	Feb. 20	5	5	Bristol 5 p.c. max.	88–89a	..	..
855,000	,,	Apl. 3	7	8	British Ord.	110–115	..	111¾–112
100,000	,,	Dec 19	7	7	Do. 7 p.c. Pref.	115–120	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69–71	..	..
450 000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	92–95	..	..
100,000	,,	Jan. 9	5	5	Cambridge 5 p.c. Deb.	94–97	..	95½
100,000	10	Dec 5	8	6	Cape Town, Ltd	8⅝–9½	..	..
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref.	6¾–7¼*	..	..
150,000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb.	71–76	..	..
626,860	,,	Feb. 20	6	6	Cardiff Con. Ord.	96–99	..	..
237,860	,,	Jan. 9	7½	7½	Do. 7½ p.c. Red. Deb.	98–101	..	..
157,150	,,	Feb. 20	5	6¾	Chester 5 p.c Ord.	88–93b	..	..
98,936	1	May 8	†2/-	†2/-	Colombo, Ltd. Ord.	33/–35/.*	..	..
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	1-/6–20/6*	..	..
375,402	1	Apl. 3	1/9½	1/9½	Colonial Gas Assn. Ld. Ord	20/–22/-	..	..
187,848	1	,,	1/7½	1/7½	Do. 6 p.c. Pref.	19/–21/-	..	..
2,073,280	Stk.	Feb. 20	5	7	Commercial Ord.	90–93	..	91½–92
475,000	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	57–60	..	58
787,560	,,	Feb. 20	7	7	Croydon sliding scale.	105–108	..	..
453,100	,,	,,	5	5	Do. max. div.	83–86	..	83–85
542,270	,,	Mar. 6	7	10	Derby Con.	115–125a	..	..
55,000	,,	Dec. 19	4	4	Do Deb.	67–70c	..	..
209,000	,,	Mar. 6	5	5	East Hull Ord. 5 p.c.	71–73	..	..
1,002,180	10	Mar. 20	†4	†7	European, Ltd.	13½–14¼	..	13½–14
18,629,125	Stk.	Feb. 20	5⅜	5½	Gas Light & Coke 4 p.c. Ord.	18/9–19/3f	..	18/10½–19/1½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63½–65½	..	64–65
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77–80	..	77½–78¼
5,602,620	,,	Dec. 19	3	3	Do. 3 p.c. Con. Deb.	59–62	..	60½–61½
5,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	98–101	..	..
161,480	,,	Feb. 20	10	10	Harrogate Cons. 10 p.c. max.	160–165	..	..
82,500	,,	Mar. 20	7	7	Hastings & St. L. 5 p.c. Conv.	96–101	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	78–82	..	..
70,000	10	May 22	†10	8	Hongkong & China, Ltd.	13¾–14¼*	–¾	..
213,200	Stk.	Mar. 6	6	6	Hornsey Con. 3½ p.c.	90–93	..	..
2,436,594	,,	May 22	10	25	Imperial Continental Cap.	345–365*	–25	345–380
223,130	,,	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb.	80–85	..	..
235,242	,,	Mar. 20	8½	8½	Lea Bridge 5 p.c. Ord.	123–128	..	124–125
2,145,907	,,	Feb. 20	6	6	Liverpool 5 p.c. Ord.	91½–92b½	+ ½	..
600,000	,,	Mar. 20	7	7	Do. 7 p.c. Red. Pref.	100–102b	..	..
165,736	,,	Feb. 20	9	8	Maidstone 5 p.c. Cap.	119–124	..	..
63,480	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	52–55	..	..
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean	5½–6	..	..
392,000	—	Apl. 1	5½	5¼	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	90–93	..	..
541,920	Stk.	May 22	†6	†8	Montevideo, Ltd.	107–112*	..	108
2,061,315	,,	Feb. 20	5	5½	Newcastle & Gateshead Con.	16/3–16/9d/f	+ -/3	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	70–71d	..	..
691,705	,,	Dec. 19	3½	3½	Do. 3½ p.c. Deb.	66¾–67¼d	..	..
169,940	,,	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	109–114	..	..
396,160	,,	Feb. 6	5	5	Northampton 5 p.c. max.	74–77	..	..
300,000	,,	Apl. 24	9	7	Oriental, Ltd.	108–113	..	111½–112½
60,000	5	13 My., '15	—	—	Ottoman	0–¼	..	..
205,162	Stk.	Jan. 9	8	8	Plym'th & Stonehouse 5 p.c.	107–110	..	..
424,416	,,	Feb. 20	8	8	Portsm'th Con. Stk. 4 p.c. Std	110–115	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	78–81	..	..
186,000	100	Dec. 2	4	4	Primitiva 4 p.c. Red. Deb.	92–95	..	..
677,837	Stk.	Jan. 23	4	4	Do. 4 p.c. Red. Deb. 1911	81–84	..	..
371,496	,,	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	81–84	..	..
150,000	10	Apl. 3	6	6	San Paulo 6 p.c. Pref.	8¾–9	..	..
1,736,968	Stk.	Mar. 20	6½	6½	Sheffield Cons.	103–105e	..	..
95,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	76–78c	..	..
90,000	10	June 13	‡4	‡4	South African	4–6	..	5½
6,709,895	Stk.	Feb. 20	6	7½	South Met. Ord.	102–104	..	102⅝–103
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	107–110	..	109
1,895,445	,,	Jan. 9	3	3	Do. 3 p.c. Deb.	58–61	..	61
734,000	,,	Mar. 6	6½	6½	Do. 6½ p.c. Red. Db.	99–101	..	..
91,500	,,	Mar. 20	8½	8½	South Shields Con.	106¼–107½d	..	..
1,543,795	,,	Feb. 20	6½	6½	South Suburban Ord. 5 p.c.	101–104	+1	102⅝–103¾
468,837	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	93–96	..	95½
647,740	,,	Feb. 20	5	5	Southampton Ord. 5 p.c. max.	76–79	..	..
121,275	,,	Dec. 19	4	4	Do. 4 p.c. Deb.	72–75	..	..
179,014	,,	Feb. 20	8	8	Sutton Ord.	113–116	..	..
67,828	,,	Jan. 9	5	5	Do. 5 p.c. Deb.	92–95	..	..
250,000	,,	Mar. 6	7	7	Swansea 7 p.c. Red. Pref.	98–100	..	..
200,000	,,	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	99–101	..	..
1,076,490	,,	Mar. 6	6⅝	6⅝	Tottenham District Ord.	101–105	..	104½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	95–98	..	..
199,005	,,	Dec. 5	4	4	Do. 4 p.c. Deb.	73–76	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3¾–4¾	..	..
85,701	Stk.	Mar. 20	6	6	Do. 6 p.c. Red. Deb.	75–80	..	..
309,094	,,	Mar. 6	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	94–99	..	..
88,336	,,	,,	5	5	Do. 5 p.c. pref.	85–90	..	86–90
1,180,970	,,	—	—	—	Wandsworth, Wimbledon, and Epsom Cons.	108–113	..	110½–112
200,000	,,	Feb. 20	5	5	Do. 5 p.c. Pref.	85–90	..	..
488,344	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	92–97	..	95

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div=10 p.ct. p.a. less tax and less tax on interim dividend.

STOCK ISSUES.

By Order of the Directors.

THE RUGBY GAS COMPANY.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

£15,000

SIX PER CENT. REDEEMABLE PREFERENCE STOCK.

Minimum Price of Issue, Par.

To be redeemed at Par on the 1st of July, 1950.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Tuesday, the 3rd of June) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

By Order of the Directors.

PRESCOT AND DISTRICT GAS COMPANY.

ISSUE OF 6 PER CENT. £1 PREFERENCE SHARES.

THE Prescot and District Gas Company offer for SALE by TENDER 10,000 6 PER CENT. £1 PREFERENCE SHARES (ranking equally with existing similar Shares) in multiples of £1, the minimum price of issue being par.

Copies of the Prospectus and any further particulars may be obtained from the undersigned at the Offices of the Company.

Forms of Tender (supplied with the Prospectus) should be returned in accordance with the instructions therein contained on or before Saturday, the 7th of June, 1930.

J. E. HALL,
Secretary.

Moss Street,
Prescot,
May 22, 1930.

NEW "THOMPSON"
BOILERS
EX STOCK.

MOST MODERN "DISH-END" TYPE
WITH CORRUGATED SECTIONS.

	W.P.	Shop No.
Two 30 ft. × 9 ft. 3 ins. ×	200 lbs.	6947/8
One 30 ft. × 9 ft. 3 ins. ×	180 lbs.	6862
Two 30 ft. × 9 ft. 3 ins. ×	160 lbs.	6848/9
One 30 ft. × 9 ft. 3 ins. ×	120 lbs.	6889
Two 30 ft. × 8 ft. 6 ins. ×	160 lbs.	6970/1
Two 30 ft. × 8 ft. 3 ins. ×	160 lbs.	6871/2
One 30 ft. × 8 ft. 3 ins. ×	120 lbs.	6931
One 28 ft. × 7 ft. 6 ins. ×	160 lbs.	6785
Two 20 ft. × 6 ft. 0 ins. ×	150 lbs.	6864/5
One F.E. 30 ft. × 8 ft. 0 ins. ×	180 lbs.	6574

All the above Boilers are built from "Siemens Martin" Acid Steel.

SUPERHEATERS AND PIPEWORK INSTALLATIONS.

Repairs to all types of Boilers by first-class men.

JOHN THOMPSON
(WOLVERHAMPTON) LTD.,
WOLVERHAMPTON, ENG.

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H. BARNES,
Clerk of the Council.

Council Offices,
Shipley,
May 15, 1930.

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The Corporation do not bind themselves to accept the lowest or any Tender.

G. E. BARFORD,
Town Clerk.

Municipal Offices,
Chelmsford,
May 20, 1930.

GLOUCESTER GAS LIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the Supply of about 30,000 Tons of GAS COAL—SCREENED, UNSCREENED, or NUTS—for the period ending the 31st of July, 1931, in such monthly quantities as may be required by the Company.

Tenders to state the price delivered at the Gas Company's Siding (London, Midland, & Scottish Railway), Hempsted, near Gloucester, or if sent by Water, the price delivered into Carts at the Gas Company's Wharf on the Gloucester and Berkeley Canal.

Further particulars and Forms of Tender may be obtained from the undersigned.

Sealed Tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be addressed to the Chairman, Gas Offices, Eastgate Street, Gloucester, and delivered not later than Wednesday, the 4th day of June, 1930.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any Tender.

By order,
T. BERNARD JAMES,
Secretary.

Gas Offices,
Gloucester,
May 12, 1930.

SITTINGBOURNE AND MILTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS are invited for the Supply, as required, of about 2000 Tons of UNSCREENED GAS COAL and 1000 Tons of GAS NUTS, to be delivered to Sittingbourne Railway Station or to the Council's Wharf, Milton Creek.

Forms of Tender may be obtained on application to the Engineer and Manager, Gas Offices, Milton, Sittingbourne.

Tenders, sealed and endorsed "Gas Coal," to be delivered to the undersigned before the 21st of June, 1930.

The Council do not bind themselves to accept the lowest or any Tender.

G. H. POTTER,
Clerk.

76, High Street,
Sittingbourne.

HEBDEN BRIDGE AND MYTHOLMROYD GAS BOARD.

TENDERS are invited for the Supply of 7000 Tons of GAS NUTS, to be Delivered at the Gas-Works Sidings, Hebden Bridge Station (L.M.S.R.), in such monthly quantities as may be required during the Twelve Months July 1, 1930, to June 30, 1931.

Forms of Tender can be obtained on application to Mr. T. H. Nield, Engineer and Manager, Carlton Street, Hebden Bridge.

Sealed Tenders, endorsed "Tender for Gas Coal," must be delivered to the undersigned not later than Tuesday, the 10th of June, 1930.

The Board do not bind themselves to accept the lowest or any Tender.

SAM OGDEN,
Clerk of the Board.

Carlton Street,
Hebden Bridge,
May 20, 1930.

CHAPEL, WHALEY AND DISTRICT GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of 4200 Tons either DRY CLEANED or WASHED GAS NUTS, delivered to Gas Company's Sidings, Whaley Bridge, over the Twelve Months commencing July 1, 1930.

Sealed Tenders, endorsed "Coal Contract," and addressed "The Chairman, Chapel, Whaley and District Gas Company, Imperial Chambers, Dale Road, Matlock," must be received not later than June 16, 1930.

Form of Tender may be obtained upon application to the undersigned.

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J. H. CLARKE,
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Gas-Works,
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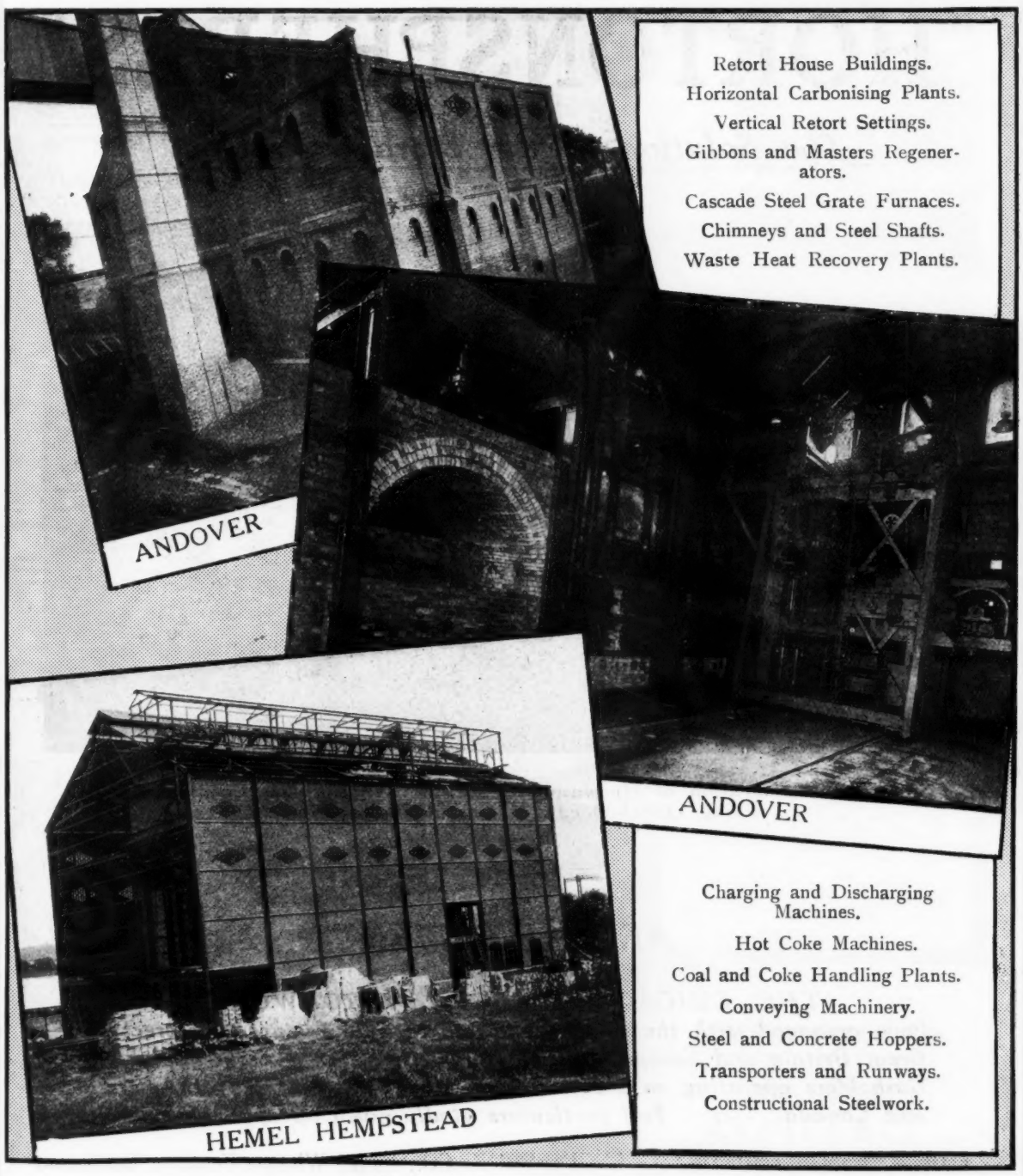

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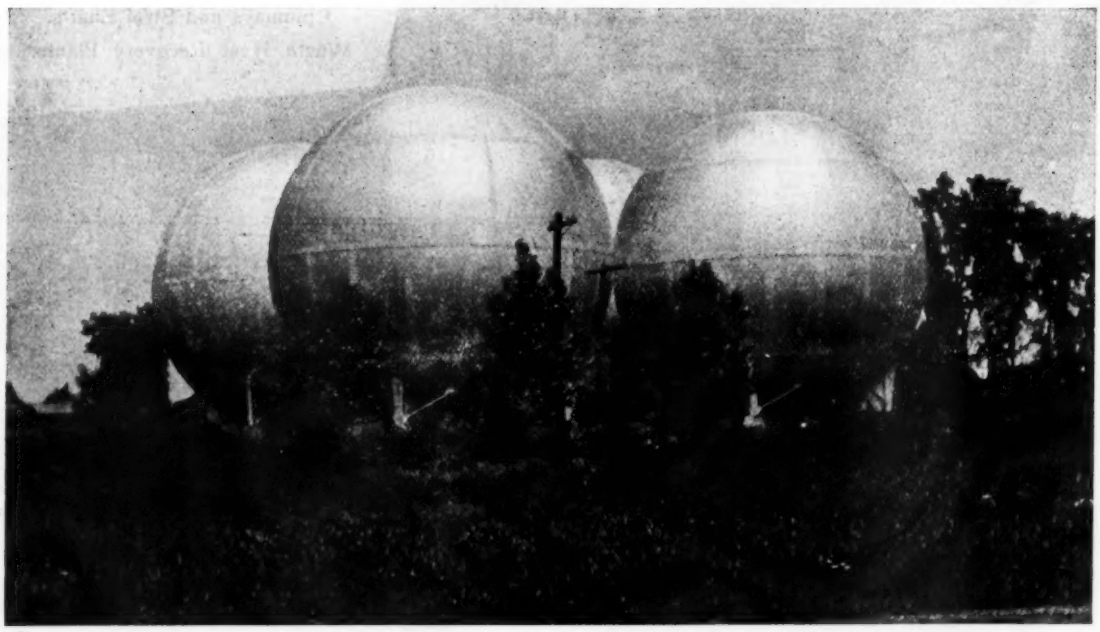

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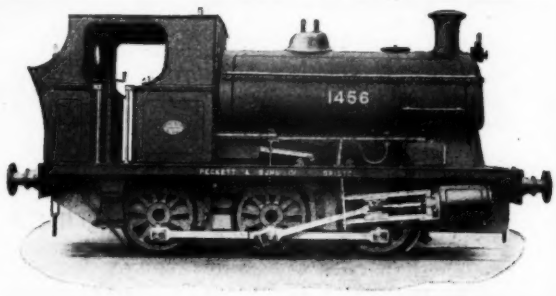

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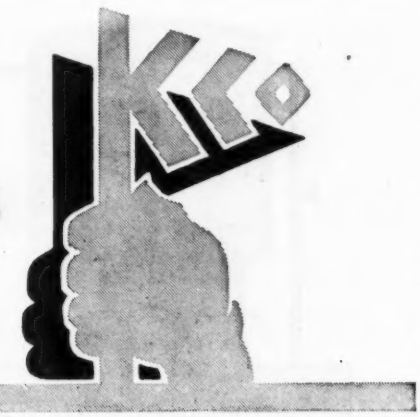

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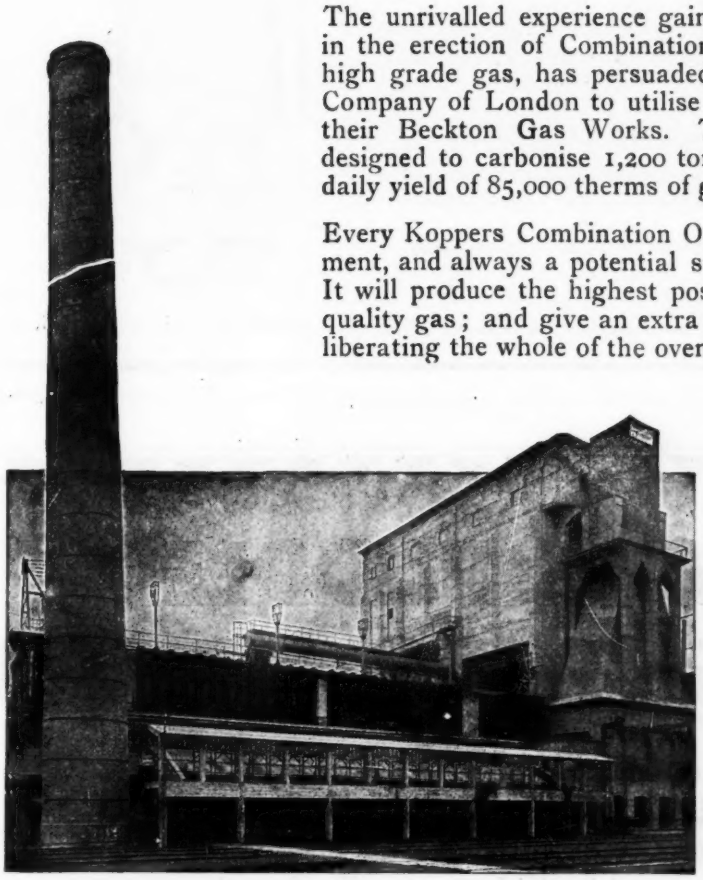

ILLUSTRATION:
Koppers Combination Oven Plant at Düsseldorf Gas Works, carbonising 400 tons of coal per day.

KOPPERS
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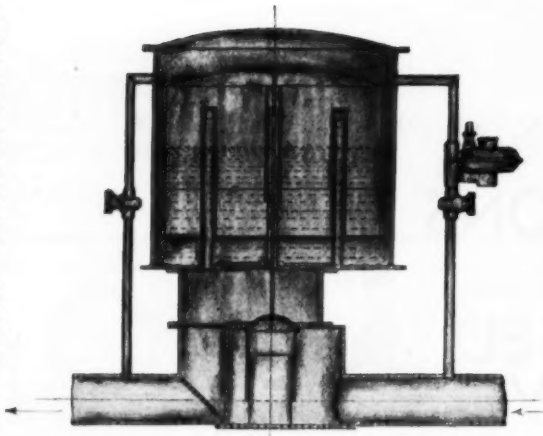
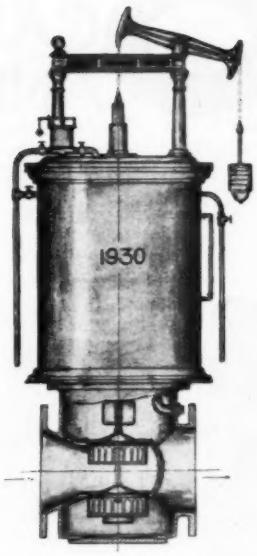


1875

Peebles
Station & District Governors



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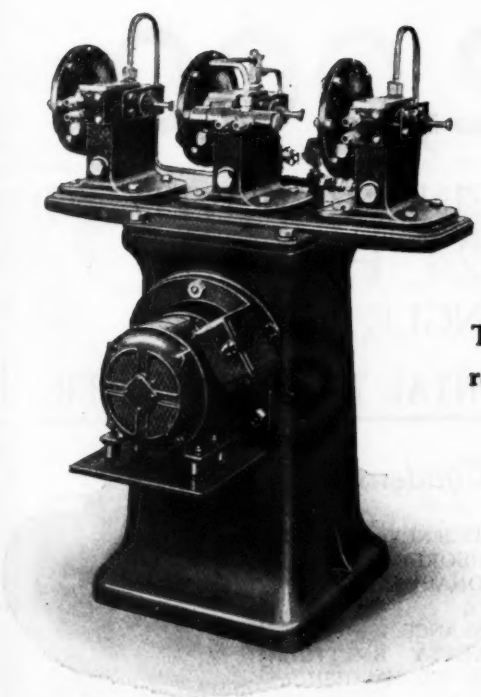

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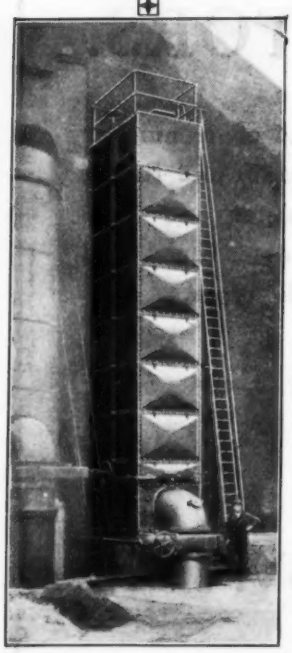

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